CHAPTER 6

The Players

Clearly, the most prized possessions in the industry are the leases allowing access to giant oil and gas fields; however these fields must be found and this entails risk. This chapter looks at the background of how oil companies come to possess oil and gas 'properties' and the processes and players involved in their development.

Bids and Blocks

Acreage, blocks and concessions all refer to a legally recognised interest in an oil and gas property. This is surrendered by a land-owner in exchange for royalties and other considerations. Despite the fact that most oil and gas deals are confidential business transactions, almost all are bid for openly. The final contract and choice of the oil company will depend on the nature of the land-owner and development complexity[1].

Land-owners

Governments have different obligations from institutions, which in turn have different needs to those of private individuals. Governments are driven by a much wider agenda ranging from economic sustainability, obligations to future generations and social responsibility. Institutional and private individuals are generally more concerned with a Return on Investment (ROI) within a given time period[2].

Development Complexity

The cost and complexity of a particular development depends on its location, size and the extent of geological knowledge. If the lease is offshore, greater complexity

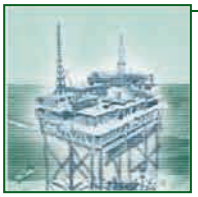
Platform types

Get to know the main types of Petrobras platforms.

FPSO platforms - FPSOs (Floating, Production, Storage and Offloading vessels) can process and store crude oil, and offload the oil and/or natural gas. A process plant is installed on the ship's deck to separate and treat the fluids from the wells. After the crude is separated from the water and gas, it is stored in tanks on the actual vessel and then offloaded to a relief ship every so often.

The relief vessel is an oil tanker that moors on the FPSO stern to receive the crude stored in its tanks and then transport it onshore. Compressed gas is sent onshore through gas pipelines and/or injected back into the reservoir. The larger FPSOs have a daily processing capacity of some 200,000 barrels of oil, with an associated gas production of approximately two million cubic meters a day.

Round-hull FPSO - type platform This is a pioneering FPSO platform for its round-hull shape, and the first to produce, store and offload oil. The platform produces in deep waters, ranging from 1,000 to 1,500 meters. The round shape increases stability in the sea, since the waves circle the vessel. Its hull, made out of two layers of steel plates, is more versatile and stable, allowing operation under much more severe environmental conditions and affording the vessel more safety with regard to oil leakage into the sea.



Fixed platforms - These were the first units to be used. Preference has been given to them in fields located in water depths to 200m. Fixed platforms generally consist of modular steel structures installed at the operation site with piles driven into the seabed. Fixed platforms are designed to receive all drilling equipment, material storage, and staff accommodation, plus all well-production facilities.

Jack-up platforms - These consist basically of a barge fitted with a support structure, or legs that when activated mechanically or hydraulically, are lowered until they reach the seabed. The platform is then raised above the water level to a safe height, away from the action of the waves. These platforms are mobile and are pulled by tugboats or are self-propelled. They are designed to drill exploratory wells on the continental shelf in depths varying from 5 to 130 meters.

Semi-submersible platforms - Semi-submersible platforms consist of a structure of one or more decks supported by submerged pontoons. A pontoon moves in accordance with the action of waves, currents and winds, and this may damage the equipment that is to be lowered into the well. That is why it must be set in position on the surface of the sea, within a tolerance radius dictated by the sub-surface equipment. Two kinds of system are responsible for positioning the pontoon: the anchoring system and dynamic positioning system.

The anchoring system consists of 8 to 12 anchors and cables and/or chains, like springs that produce efforts that can put the pontoon back in position when it is moved by the action of the waves, winds and currents.

In the dynamic positioning system, there is no physical connection between the platform and the seabed, except in relation to the drilling equipment. Acoustic sensors determine the driftage, while the computer-controlled propellers in the hull bring the platform back into position.

Semi-submersibles may or may not be self-propelled. In any event, they are more mobile and are preferred for drilling wildcat wells.

Drill ships - A drill ship is a vessel designed to drill subsea wells. Its drilling tower is located midship, where an opening in the hull allows the drill string to pass through. The drill ship positioning system, consisting of acoustic sensors, propellers and computers, cancels out the effects of the wind, waves and currents that tend to move the ship from its position.

and cost will be added. This is because offshore fields require more capital, technical expertise and logistical planning than onshore fields. The rule of thumb is the greater the water depth, the greater the complexity and cost, as higher specification rigs are required.

Developments that are located in shallow waters (defined as up to 1,500-ft or 500 m water depth to the seabed) may use fixed platforms. Greater complexity is associated with developments located in deep seas (up to 6,560-ft or 2000 m of water) as they require tension leg platforms or semi-submersible rigs. The greatest technical and financial challenges are linked with ultra-deepwater developments located in water depths of 8,200-ft (2500 m) or more. In these water depths, semi-submersible facilities or Floating Production, Storage, and Offloading (FPSO) vessels are required[3].

Block size will also add complexity and cost. Typically, offshore Gulf of Mexico (GOM) blocks are nine square miles in size. Offshore North Sea block sizes vary between 230 square miles and 460 square miles. Blocks in new exploratory frontiers can be much larger. Exemplifying this are Brazilian exploratory blocks such as those in the Foz de Amazonas which can be 2000 square miles in area. Locating reserves in such a large area is no mean feat.

Where geological knowledge exists, exploration risk is reduced. Where previous wells have been drilled, reservoirs and conditions have been characterised and this acts as a guide to future drilling; however, in wildcat or exploratory wells where reservoir characterisation is not present, complexity, cost and risk are increased.

Royalties

A 'royalty' is an interest in an oil and gas lease that gives the owner of the land the right to receive a portion of the production from the leased acreage or proceeds from the sale of production. This generally does not require the owner to pay any portion of the costs of drilling or operating the wells on the leased acreage. Royalties may be either land-owner's royalties or overriding royalties. Land-owners royalties are reserved by the owner of the leased acreage at the time the lease is granted. Overriding royalties are usually reserved by an owner of the leasehold in connection with a transfer to a subsequent owner. Royalties can vary from 100% in the case of national companies, to 50% in joint ventures and to as little as 10% in mature assets. The level of royalty depends on the complexity of the development and investment required. Royalties are not necessarily the most important aspect of an oil and gas deal as creating local content and infrastructure maybe equally important[4].

Producers seek exploration and development assets in order to maintain a return to shareholders. Market watchers apply considerable weight to proved reserves and production when analysing share values. They are the long- term measure of an oil company's health, while daily production represents short-term cash flow.

Portfolios Balance Risk

How do oil companies routinely back some of the most expensive and risky ventures on earth (i.e. deepwater exploration drilling) and still make profits? Oil companies can sustain the heavy losses of a wildcat (drilling for unproven reserves with limited geological knowledge) because they have a portfolio of assets generating cash. This is usually managed on the basis of markets, geography and economics. Oil companies employ geological modelling, offset data and exploratory wells to pinpoint reserves. Both oil companies and concession holders use due diligence systems to appraise certain blocks (a lease area inland or offshore) according to historic finds to date or the likelihood of finding oil and gas. Where no wells have been previously drilled, the oil company will drill a wildcat. This represents the highest degree of risk, but can be balanced with finds and production from other mature assets generating cash. The portfolio is usually split along regions, countries and assets. It is here that market conditions prevail. Oil companies will use financial models that take into account the future value of hydrocarbon reserves at different barrel price scenarios and demand. Oil companies will apply financial models assessing economic and production variables such as the '3 Ps' and the present value of reserves[5].

Gaining a Concession

Land-owners attract attention to prospective offerings or licensing rounds by informing industry analysts and firms specialising in oil and gas leases. They may also conduct 'road-shows' where key members of the land-owners management will present 'upstream opportunities' at industry events such as the International Petroleum Conference, the World Petroleum Conference and at financial centres around the world.

Subsequently, and without exception, all land-owners will pre-qualify companies with an invitation to tender. Strict technical and financial criteria are applied before this initial application for a concession is accepted. In this way, concession holders (governments, institutions or private individuals) can screen prospective oil companies or 'operators' to see that they are actually capable of meeting the challenges associated with the exploration and production of hydrocarbons and pay the all important royalties.

Once a prospective operator has been qualified, they can then proceed to the next stage. Qualification leads to bidding or negotiating the contract for lease acquisition. Further steps will be seismic permitting, lease option negotiations, and preparing pooling and unitisation agreements. It should be noted that unitisation agreements are usually only entered into after discovery and some production has taken place. This usually occurs when the collective area operators realise that their field can produce more oil as a single unit rather than several sub-units. Negotiating a unitisation agreement is incredibly complex, particularly in the case of land leases where a large number of land-owners are involved. Typically, this is an open auction, sealed bid or a negotiated deal. Open auctions are competitive bids for leases, sealed bids are posted and closed negotiations are held between parties. Each has its merits and downfalls; sometimes more can be negotiated off the bidding table rather than on the table[6].

'Producers-88' Lease Form

Although there is no standard form of oil and gas lease, a common form for US oil and gas leases is known as the 'Producers 88'. The name arises from an oilman or 'producer' who was seeking to purchase a lease. This producer had a certain deal in mind, but had no printed contract outlining the terms and conditions. The oilman sought a printer's shop to get the form printed. The printer's foreman needed to give the printing job a name and pencilled in 'Producers-88' to the job referring to its sequence in the press. Due to an oversight, the pencilled reference was printed on the upper left-hand corner and the name stuck, 'Producers-88' lease form.

Not every producing company used the same printer, but anecdotes show that many farmers (land-owners holding the title deeds) would only sign a 'Producers-88' form of lease. Consequently, majors, independents and 'land-men' had their own forms of leases printed, many of which were similar in content, but all of which had 'Producers-88' printed in the upper left-hand corner.

The pre-printed form of lease typically presented to a mineral owner has basic terms and provisions such as the name of the land-owner and oil company, the description of the land, the duration of the lease, the amount (fraction or percentage) of royalty, the name of the depository bank for the payment of rentals, and the amount of rentals (if it is not a paid-up lease)[7].

'Paperweights'

There is no single form of lease that meets all land-owners specific needs. Each lease is a bulky set of documents prepared on an individual basis. Usually, the oil company

will have to accept the bid lease conditions offered, but in certain cases (i.e. for a multi-billion dollar investment) negotiating leeway exists. Conditions will cover the granting of a lease, royalty, shut-in well, pooling and unitisation, delay rental and partial release, operations and offsetting production, assignment, warranty, and force majeure clauses.

On entering an oil concession, the land-owner and oil company have different interests. The land-owner is interested in gaining as much bonus, royalty and terms such as local capability as possible. The oil company is interested in limiting its obligations to the land-owner and wants the lease to contain terms that are as broad as possible. In most instances, the parties will compromise to reach a mutually acceptable middle ground and a contract will be signed[8].

Bargaining Power

As in all business transactions, the party with the greater bargaining power and knowledge sets the terms. It has been said that governments, at times, can be at a negotiating disadvantage when dealing with International Oil Companies (IOCs). At any given time, IOCs can draw on a much wider knowledge base of global trading conditions. In contrast, a national government is limited to national conditions. This was part of the rationale for the nationalisation of petroleum in many countries and the formation of the Organisation of the Petroleum Exporting Countries (OPEC). Nonetheless, land-owners will always hold the upper hand because they 'own' the oil and gas reserves. Oil companies need reserves to keep trading so they are willing to 'buy' the technical and financial risks associated with exploration and pay royalties; however, neither can profit without the other as there is a mutual need.

Today, gas exporting countries have formed alliances to share information on global gas trends. This experience shows that granting access to oil and gas rights are strong bargaining tools which can help obtain benefits beyond royalties[9].

The Oil Is Ours …But You May Develop the Gas

Some twenty-five years ago, the Saudi royal family finished the process of re-nationalisation of the country's oil and gas reserves. This allowed Aramco, the national oil company, to join a growing group of oil companies and countries that re-nationalised their hydrocarbons; for example, countries such as Mexico, Venezuela and Iran. By some accounts, between 1970 and 1976, nearly 20 countries asserted their national sovereignty over their operations. Driven by the need to develop gas reserves (to

meet the growing demand for gas exports and to keep oil for exports), many countries have slowly relaxed their national controls. This has been accomplished through joint ventures, contracts with service companies and ownership licenses which allow larger oil companies to return to previously nationalised oil markets[10].

Many types of oil and gas contracts exist. In this section, we consider the process of selecting and contracting oilfield service companies.

It is worth distinguishing oil and gas operating contracts from service and supply contracts. We have already seen how operating contracts provide a framework for paying hydrocarbon production royalties (bids and blocks). Now, we can consider how service contracts enable the supply of equipment and technical services that are necessary for hydrocarbon production.

Outsourcing

Traditionally, oil companies whether IOCs, NOCs or independents have always outsourced certain oilfield activities, such as rig supply or facilities engineering. As the industry consolidated in the 80s and 90s, the volume of outsourcing increased as new definitions of non-core activities were applied to a greater number of activities and disciplines. Nowadays, non-core activities are defined differently according to the discipline and oil-company in question; however, the common thread that emerges is that all disciplines will have at least some outsourced elements. This means that any given oil company will have service providers in many different areas of activity. The extent of actual outsourcing depends very much on the culture of the oil company, the degree to which a task is defined as core and its accompanying level of commercial sensitivity.

Core Activities

Facilities engineering, for example, is an area that is traditionally outsourced. Certain oil companies, however, may consider production or drilling and completions as non-core. In this case, an oil company representative will act as a project manager, but the actual engineering is conducted by a lead service company and a number of sub-contractors. Other oil companies may consider disciplines such as reservoir management as core areas, or as sensitive functions, and therefore not wish to outsource the service. Almost all operators consider exploration and reservoir management as core to their operations because these two activities can make or break a company[11].

Major oil and gas disciplines are classed as:

- Facilities (platforms)
- Drilling and completions
- Production
- Reservoir engineering
- Health, Safety and Environment (HSE)
- Management systems (IT and Accounting)
- Project management, and
- Project economics/financing.

Oil Service and Supply Companies

Fortune 500 Top 15 Oil Companies

This table shows the top 15 oil companies that are listed by the Forbes Fortune 500 group and floated on the New York Stock Exchange (NYSE) or other American stock markets as of 2007. With the fall of the oil curtain, we can expect more NOCs such as Sinopec, CNPC, Petrobras, Pemex and Statoil Hydro to be listed.

Rank	Company	500 Rank	Revenues ($ millions)
1	ExxonMobil	2	347,254.0
2	Royal Dutch Shell	3	318,845.0
3	BP	4	274,316.0
4	Chevron	7	200,567.0
5	ConocoPhillips	9	172,451.0
6	Total	10	168,356.7
7	Sinopec	17	131,636.0
8	China National Petroleum	24	110,520.2
9	ENI	26	109,014.2
10	Pemex	34	97,469.3
11	Valero Energy	43	91,051.0
12	Petrobras	65	72,347.0
13	Statoil	78	66,280.3
14	Repsol YPF	90	60,920.9
15	Marathon Oil	92	60,643.0

Many of the large service companies are floated on the Philadelphia Stock Exchange; however, some companies such as Schlumberger, Halliburton, Baker Hughes and Weatherford are listed on the NYSE. The Philadelphia exchange runs an Oil Services Index (OSXSM) which is price-weighted and comprise companies that provide oil drilling and production services, oil field equipment, support services and geophysical/reservoir services. The OSX was set to an initial value of 75 on December 31, 1996 and commenced trading on February 24, 1997.

Table shows Philadelphia Oil Service Stocks – Large Cap Diversified, Mid Cap Diversified and Contract Drillers
Some OSX companies are:

1) Baker Hughes Inc. (BHI)

2) R&B Falcon Drilling Company, Inc. (FLC)

3) Global Industries Ltd. (GLBL)

4) Halliburton Co. (HAL)

5) Nabors Industries Inc NBR

6) Noble Drilling Corporation (NBL)

7) Rowan Companies, Inc. (RDC)

8) TransoceanSedcoForex

9) Smith International Inc. (SII)

10) Schlumberger Ltd. (SLB)

11) Tidewater, Inc. (TDW)

12) Weatherford WFD

National Factors

Many service companies can trace their origins to as far back as 50 years ago, and in some cases, as much as a century. These companies will have built up strong positions in technological niches and markets. Their positions will be based on local applications, relationships, investment and management philosophy.

Variations in market presence occur due to political situations, governmental policy and the trading regulations between countries; therefore, certain service companies will be stronger in certain markets and enjoy a leadership position, while in other

geographic areas they will have only a skeletal presence. In this way, the service sector tends to balance itself out globally with the larger companies tending to consolidate their market share in certain areas while being weaker in others. This occurs with giant service companies such as Baker Hughes, Schlumberger and Halliburton. One or more of these service companies may have a large market share in Latin America and the North Sea, while having a reduced presence in the Middle East. By the same token, the other service company's operations will reflect the opposite; it will have a stronger presence in the Middle East and a lower presence in other areas[12].

Operator Type

Large IOCs such as Shell and BP will always tend to favour centralised service agreements due to the high number of operating assets these companies hold. A central procurement contract offers global supply and pricing advantages which will have been negotiated by a head or regional office with bulk volumes in mind. Many such contracts exist and are aptly named such as the 'Big Lever', 'Preferred Contractor' or the most popular term these days, Master Service Agreement or MSA. The oil companies will also appoint local focal points which enable the contracts and services to be managed more effectively and in accordance with local needs.

For certain products that can be bought in bulk such as casing, bits and drilling fluids, this provides certainty of business on both sides. Independents may also develop global preferred service agreements but, due to a much smaller number of operating assets, their contracts will be less centralised and will tend toward establishing contact with major service companies on location[13]. Sometimes smaller oil companies may form 'co-ops' to purchase commonly-used items in bulk to get a low price. They usually do this thorough the auspices of an area supply store.

Process of Selection

Despite the oil and gas industry being highly globalised, most of the factors that influence the selection of contractors are locally based. These include variations from nation to nation, operator type, the extent of goodwill between companies, technical innovation and price. The actual selection of contractors is a complex process that requires oil companies to appoint a project manager or other executives to act as a tender board in order to prepare a contracting strategy.

This document will cover the prequalification of tenderers, a finalized bidders list, finalised technical and commercial specifications, the preparation and issuing of a

tender document, bid clarification, issuing of clarifications and addendum to tenderers, preparing company estimates, the evaluation of technical and commercial bids, presentations to the project manager or tender board, presentations to the Ministry that deals with oil and gas leases, the awarding of contracts, start up (mobilisation) and budget calculations among other things. Corporate governance, ethical standards and local content targets are also often included[14].

Typically, IOCs will employ a global focal point or a project or technology leader with responsibility for the contracting strategy and direction. Each region or major asset will also have a local specialist or focal point. This local specialist will have a local service company counterpart. Other staff will include service personnel seconded to the oil company's local offices[15].

National Oil Companies

NOCs are more likely to contract long-term services and develop partnerships with service companies. NOCs, despite the perception to the contrary, provides many of the most lucrative service contracts. The predominant philosophy or perception is that 'the lowest price wins'. This may be applicable in some cases, but in general, the NOCs often offer long- term fixed revenue contracts, something that IOCs rarely offer.

Some NOCs are obliged under the laws of their country to accept the low bid. This can cause problems as many fly-by-night companies deliberately lower a bid to get the work or concession and try to figure out later how they are going to fulfill its terms.

Goodwill

This concept covers global relationships that permit the exchange of technology, knowledge and operational know-how. These relationships exist at many levels. Some oil companies use bulk-buying contracts to supply international operations, while others use Joint Industry Projects or JIPs, Other oil companies rely on technology cooperation agreements and personal relationships with their service company counterparts and small specialised companies.

Small companies may not achieve large economies of scale, but at the same time they do not have large overheads. Because they can act rapidly, they can often beat the giants when it comes to developing new technology. Operators develop technology in-house through joint industry projects and with best-in-class companies; for example,

Shell and Petrobras respectively are involved in the monobore and the Procap 3000 initiatives which are two examples of technology cascading downward.

Underlying the monobore (a vision of drilling and casing a single-diameter well from top to bottom) is the creation of two businesses to develop the downhole tools, tubes and markets for expandables. Procap 3000, a range of exploration and production technologies, is paving the way in ultra-deepwater development. Drilling contractors have introduced simultaneous drilling and completion of two wells by way of the dual-activity derrick system. Additionally, the billion-dollar think tanks and research and development facilities that major service companies own are continually creating new technologies.

So how do small companies compete against this backdrop? How do they succeed without the benefit of marketing channels or the influence of larger service companies?

Small companies can distinguish themselves by providing a service that includes applications analysis, technical recommendations and rig-site support through end-of-well reporting[16].

If they can maintain market leadership, they will attract the attention of operators interested in new technology. Certain oil companies select market leaders in what they deem essential technology and work with those leaders to develop new technologies (tough luck if you're not No. 1) .

Tangled Thicket

Traditionally, the oil company appoints a lead service contractor who may or may not be responsible for naming a drilling unit provider. The complexity of the drilling unit required will also affect whether this decision is made by the lead contractor or oil company. Drilling units (e.g. drillships, jack-ups, semi-submersibles or land rigs) will vary according to offshore and onshore needs. Subsequently, specialist contractors in each activity of each discipline are selected. As very few companies can provide all the required services, the concept of integrated contracting becomes commonplace. An integrated contractor or contracting alliance allows for each party to calculate their share of the development cost and price. These calculations are then used as performance targets, with the gain or pain of reaching or not reaching the target being shared. For operators fed up with the tangled thicket of contracts

and contractors, the easiest course may lie in integrating outsourced services. This certainly reduces some of the complexity and numbers of service providers by providing a single point of contact. The appropriateness of integration, however, is very much dependent on the location and nature of the project; for example, the right approach for a development in China is probably inappropriate for Brazil. Other examples include the US GOM and the UK North Sea where contracting differs from practices.

Critics would argue that integration tends to discourage small-company services, as the main service provider will fulfil most technology requirements in-house. Only where technology is unavailable can a small company enter the project, filling a gap that no other business can.

Integrated services often mean small companies are required to meet wide-ranging legal or other tender requirements, many of which are applicable only to the major service provider. While safety is non-negotiable, it seems unfair to insist on the same levels of insurance liability for two different scopes of services. This asks small companies to bear more project risk without an accompanying increase in the reward[17]. Recently, IOCs have recognised the benefits of 'chain-of-accountability' and weigh this highly in contractor selection. Instead of dealing with myriad small providers, they limit their contracts to a few large, integrated service providers. If anything goes wrong, there is no finger-pointing. The contractor takes responsibility and fixes the problem.

Price – Market Cycles

Market cycles affect pricing more than any other aspect. In terms of tender strategy, an operator may use price competition as a way of controlling costs. In a down market, demand falls while the need to maintain utilisation remains. Here price-beating, where the lowest price wins, may be adopted by the service company to retain work. In an up-market, demand is increased and there are greater demands on utilisation; therefore, price competition is counter-productive as companies will tend not to provide services or equipment as they are diverted to the highest- paying markets.

Performance Pricing

How does one reward so many different service companies? Perhaps this is where value or performance pricing can help. The operator and small company set a performance target and price the work accordingly. If the contractor overachieves, they receive a proportion of the gain.

Conversely, if the contractor underachieves, they invoice less than the original price. It is self-evident that operators and small companies need to work more closely in developing cost-lowering technology. Increasingly, drilling engineers are becoming project managers rather than specialised engineers. Essentially, it lies with the service provider to effectively market service benefits to the operator.

This is where small companies trip up. Without established marketing channels, small companies regularly miss out on opportunities. Operators can help by focusing a small company's resources on specific projects where applications are plentiful. Cynics would argue operators are not in the business of making small companies richer, but this misses the point.

Sign-posting a project helps accelerate product development and operator savings. To that end, small companies must improve their marketing to demonstrate service benefits.

They must also develop partnerships with operators and be service-oriented rather than supply-oriented. Operators need to keep on the lookout for small companies, invest in their technology and encourage integrated service providers to use their services. Last, but not least, everyone must reassess how the reward is spread across the hydrocarbon machine[18].

Bundled or Bungled Services

It's easy to see the attractions of 'bundling' services. By integrating contracts for equipment and services, you can reduce suppliers and paperwork. In this way, fewer demands are made on your time, there is less paperwork, and there is less debating over which tool caused the trip.

Bundled contracts, however, can quickly become 'bungled' if individual Bottomhole Assembly (BHA) components and their risks are not isolated. Everything hinges on achieving a balance between risk and reward[19]. (Ref 19)

Service companies have been saying for years that the scales have tipped the wrong way. As in the past, oil companies still own acreage and all the geological or other problems it may have. Whether the reservoirs are hard-to-access, hard-to-locate or bounded by hard-to-drill formations, the challenges are inherited by the oil company. Yesterday's IOCs, however, which are really NOCs that have mainly kept their full internal R&D facilities, could grapple with the difficulties by using in-house R&D 'greenhouses' Shareholders don't mind this. In fact, it was universally agreed

that R&D investment was a way of maintaining a competitive edge; however, many modern oil companies do not have this resource anymore[20].

Consolidation in the oil industry drove this change. Profits could be handsomely boosted by reducing expenditure in various things, not least in-house R&D. Today's IOC must look elsewhere and this where the service companies fit.

The service company's concern—read gripe, if you are an operator—is that although they solve an increasing number of operator 'owned' problems, and run R&D facilities previously only undertaken by operators, rewards have remained constant over the years. Sure, rental or operating rates for equipment increase annually or have a premium according to location, but these are localised factors rather than a redistribution of reward based on risk acceptance and investment in research.

Everybody agrees that maximising oil production is the most important and valuable activity for the operator; however, nobody agrees about how to define and apply the true value of a particular activity. Mostly, the industry does simple math: costs plus margin equals price. This, however, omits the true value delivered—or not—to the operator[21].

If you don't deliver, you get hit with the penalty, a lower value invoice. While this sounds good in theory, there are drawbacks. Standard drilling service contracts allow for separated BHA component risk. That's a grand way of saying if you're a drill bit (or other) company and some other downhole tool screws up, your final bit invoice won't be affected. And quite rightly - why should it? If the bit is performing fine, but a trip is caused by another element in the BHA, the bit company won't lose out.

In an integrated contract, this type of situation causes losses at an operating/meterage and at an overall performance level. Let's continue the example. Not only does the bit company suffer a loss in revenue due to another BHA component's failure, but there is also a lower overall performance for section drilled time. This invokes a penalty clause and it is not so easy to easy to claim extenuating circumstances if all the equipment is supplied under a single company's service contract.

Things get even more complicated with the contracting of third party niche suppliers. If the equipment doesn't work properly, who bears responsibility? Worse still, what happens if this malfunctioning leads to a stuck fish or Loss-in-Hole (LIH)?

On the note of LIH, it's worth straying a bit. It can be said that LIH prices are high. Certainly, a tool that is new and has only seen a few hours downhole will always have a high LIH price because this is a function of future revenue loss. Conversely, you must account for depreciation. If the tool had many hours utilisation, it should have a much lower value.

Let's get back to our stuck fish. It causes a sidetrack and a heavier than expected LIH invoice. Bang goes any incentive for the bit's good performance. Who bears the responsibility? Who pays? If the Authority for Expenditure (AFE) is exceeded, who pays the difference?[22]

These are tough questions and some might say somewhat extreme; however, they are based in reality. Although using a main contractor approach where a single company drills and completes the entire well is not yet commonplace, this is a growing trend. The remaining dilemma is as follows: how can risk and reward be shared between the many different service components?

Perhaps performance pricing can help. The operator and main contractor set a performance target and price the work accordingly. If there is overachievement, all receive a proportion of the gain. Conversely, if a component company underachieves, it invoices less than the original price and takes a proportion of the loss. Performance pricing would reflect costs (e.g. R&D manufacturing, tool wear and tear, etc.) and some part of the value delivered to the client[23].

An appreciation for the dilemma faced by operators has been a long time coming. For many years, oil company departments were semi-autonomous and had little regard for the other departments in the company. The drilling department was responsible for drilling a hole in the ground and casing it. The hole (one could hardly call it a well at this point) was then turned over to the completions department. The drilling department started to drill the next well, leaving the completions department to remedy such problems as formation damage caused by poor drilling fluid selection, bad cement jobs, damaged casing or wellhead problems.

The formation of asset teams alleviated these problems. By holding every member of the asset team responsible for the asset and rewarded solely based on the asset's performance on production, people such as drillers suddenly got a stake in the end result, and their sloppy performance came back to bite them in cost overruns or

curtailed production performance ;a lower asset profitability meant a lower bonus for them. The same fate awaited the geology department whose sloppy work caused a well to be drilled in the wrong place.