



Innovation through contracting in the oil and gas sector

*How contracts with external partners drive
innovation in the oil and gas sector*

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Executive summary

An increasing number of CEOs see innovation as a key lever for growth and critical to achieving sustained competitive advantage across the oil and gas sector. To be more innovative, firms increasingly complement their internal innovation capabilities with solutions, ideas, and technologies from external partners such as suppliers and service providers. It is critical to appraise the contract's potential in order to foster innovation and understand the conditions under which this potential can be fully exploited, given the increased use of outsourcing and external partners in the oil and gas sector and their importance in driving innovation in outsourced service delivery.

Most recently, oil and gas companies have started using performance-based contracts (PBCs). PBCs underline the output, outcome and quality of the product/service rather than prescribing how it is delivered or which resources to use, and may tie at least a portion of the external partner's payment to its accomplishment. An important element in PBCs is therefore the clear separation between the buyer's expectations (i.e., performance goal) and the external partner's implementation (i.e., how it is achieved). PBCs are typically characterized by a relatively low degree of contractual detail, as the focus is on the external partner's outcome and a high degree of partner rewards are linked to its performance. Hence, the organization is dependent on the provider and has interest in choosing the "right" external partner.

In PBCs, the overall compensation to the external partner, consisting of the base price and an incentive, may be higher, because the risk has shifted to the partner and premium is explicit rather than absorbed into the owner's operating expenditures. The main benefit of a PBC is that it allows freedom for the external partner to deliver the product/service as it sees best. This results in more freedom for the external partner to engage in innovative activities as the partner is stimulated to lower its costs. In addition, this contract requires little information and knowledge on the inputs and processes required to deliver the product/service. However, it is extremely important to detail and measure the outcome/performance of the external partner. To successfully implement such collaborative contractual frameworks, oil and gas companies should emphasize three important stages of engaging with external partners when they want to stimulate innovation: the partner selection phase, the contract design phase, and the contract execution phase.

1. Importance of innovation is increasing, but few oil and gas companies focus on it

“Innovate or die” has become a well-known urge for large and small corporations regardless of the industry, as innovation in products and services – whether radical or incremental – is critical for companies’ sustained competitive advantage and long-term survival. For firms in the oil and gas sector this could not be more true; as the overall business structure changes, it is crucial to stay ahead of the curve through innovations. Innovation in the oil and gas sector plays a key role in reducing production costs, increasing production efficiency, supporting exploration, and ensuring that decommissioning activities are carried out effectively. Nevertheless, the oil and gas sector lags behind in developing innovative capabilities, commercializing inventions and benefiting from technological inventions from other industries. Figure 1 shows that the oil and gas sector is ranked only 12th (out of 13 industries) when it comes to being innovative.

Figure 1: Innovation in different industries

Industry	% of total	2014 volume ¹	2013 volume ¹	% change
Information technology	30%	380,325	367,028	4%
Telecommunications	13%	161,739	153,153	6%
Automotive	12%	153,872	152,221	1%
Pharmaceuticals	9%	111,479	99,950	12%
Semiconductors	9%	112,625	119,099	-5%
Medical devices	7%	93,462	99,290	-6%
Home appliances	6%	71,278	71,118	0%
Aerospace & defense	5%	62,162	63,080	-1%
Biotechnology	3%	42,584	39,685	7%
Food, tobacco & beverage	2%	26,333	21,758	21%
Oil & gas	2%	24,158	23,925	1%
Cosmetics & well-being	1%	11,017	10,197	8%
Total	100%	1,251,034	1,220,504	3%

¹ Patent activity

Source: Thomson Reuters Derwent World Patent Index, Arthur D. Little

Firms can engage in innovation through internal innovation practices (e.g., internal development, R&D and corporate entrepreneurship). However, closed innovation activities, in which innovation is initiated based on the firm’s own resources and technologies, limit the firm in responding to changing environments. Internally, firms do not have all the necessary resources to succeed in complex environments and face difficulties when trying to capture the value of their

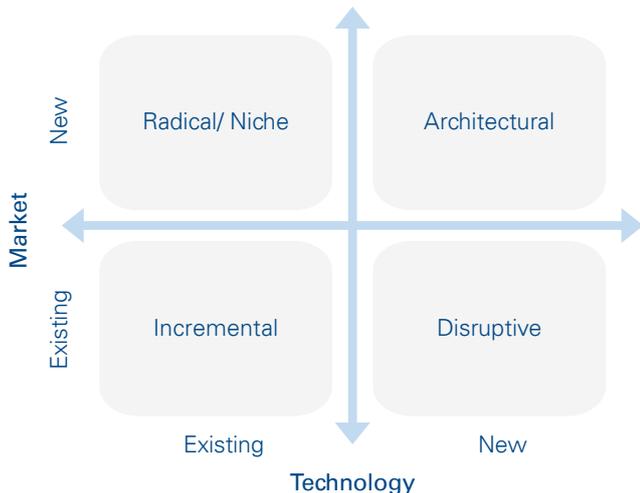
resources. As a result, the full value potential often remains underexploited. Furthermore, internal innovation practices, such as R&D, may not fit the current needs of organizations as they are characterized by high costs and risks, slow time to market and inflexibility. To be more innovative, firms increasingly complement their internal innovation capabilities with solutions, ideas, and technologies from external partners such as suppliers and service providers (in the oil and gas sector this could be, e.g., maintenance providers of refineries or oilfield and drilling services providers). External partners enhance and drive innovation in products and services, as well as service outsourcing contexts in which providers innovate to improve and optimize the daily operations performed for the buyer. Innovation may occur with external partners as result of mutual learning, complementary resources and knowledge sharing. External relationships may, however, suffer from opportunistic behavior or coordination failures that may inhibit good performance and innovation activities. Inefficiencies working with external partners often lead to project delays. Bonuses or penalties for contracted work cannot mitigate delays or the entire project risk because they are proportional to and limited by the scope of the outsourced work. Oil and gas producers use contractual frameworks to manage intercompany relationships, improve efficiencies, and mitigate project delays. Traditional frameworks used by oil and gas companies are procuring material supply and oilfield services on a primarily transactional basis, with services performed or material procured at predetermined prices, rather than performance bases under which the service provider takes a greater share of both risk and reward.

Appraising the contract’s potential to foster innovation and understanding the conditions under which this potential can be fully exploited are critical, given the importance of outsourcing and external partners in the oil and gas sector and their importance in driving innovation in outsourced service delivery. This viewpoint aims to increase our understanding of the nature and form of contract types in the oil and gas sector which have the potential to improve performance and stimulate innovation.

2. Innovation improves effectiveness and achieves long-term economic goals

Innovation is the process of translating an idea or invention into a product or service which adds value and which the customer is willing to pay for. In the context of contracting with external partners, the innovation is initiated by the external partner. There are four common types of innovation, categorized based on the product's/service's new or existing market and technology:

Figure 3: Types of innovation (contd.)



Source: Abernathy & Clark (1985) in Research Policy

Figure 2: Types of innovation

Innovation	Definition	General example	Oil & gas example
Radical/niche innovation	<ul style="list-style-type: none"> Taking lessons, skills, and technology and applying them in a different market Risk involved is low due to the reliance/reintroduction of proven technology Requires changing the technology to ensure it is accepted by the new market 	<ul style="list-style-type: none"> NASA's aircraft cushions which form back to their original shape was later marketed for use in mattresses 	<ul style="list-style-type: none"> Using nuclear magnetic resonance imaging – originally developed for medical applications – to map the amount of oil in rocks
Architectural innovation	<ul style="list-style-type: none"> Creates new industries or replaces existing ones Involves creating revolutionary technologies for new markets 	<ul style="list-style-type: none"> Even though airplanes were not the first mode of transportation, they revolutionized the way people travelled 	<ul style="list-style-type: none"> Development of unconventional fossil-fuel resources such as shale gas
Incremental innovation	<ul style="list-style-type: none"> Type of innovation which occurs most often Utilizes existing technology and increases value to the customers in existing markets Almost all companies engage in some form of incremental innovation 	<ul style="list-style-type: none"> Minor changes to the design of a product or small updates to user experiences 	<ul style="list-style-type: none"> Total's partnership with Cybernetix to develop a new inspections, maintenance, repair system (SWIMMER) to solve the challenges of maintaining aging deep-water facilities
Disruptive innovation	<ul style="list-style-type: none"> Using new technologies or processes for the company's existing market The new technology – usually after a few iterations of improving ease of use and aesthetics – replaces old technologies and disrupts existing companies 	<ul style="list-style-type: none"> Mobile phones over traditional phones. As mobile phones became cheaper, the sound quality improved and new functions were added. They replaced analogue phones 	<ul style="list-style-type: none"> Use of new drilling techniques (e.g., hydraulic fracturing or fracking) for an existing market (i.e., upstream oil and gas companies)

Source: Arthur D. Little

Innovation in the oil and gas sector

Recently, the oil and gas sector has become increasingly characterized by lower prices for longer periods of time. This has forced many oil and gas companies to reduce their costs and thereby efficiently and effectively produce oil and gas in collaboration with their external partners (e.g., drilling providers, maintenance service providers, suppliers and others). Although lowering costs is crucial, by focusing only on this need, some firms may not be able to leverage the opportunities that come with a market upturn. E.g., firms that lay off skilled staff may encounter difficulties in replacing them in the future, and businesses that do not keep pace with technological advancements and innovations are unlikely to maintain long-term sustainable competitive advantage. For many companies to survive in the long term, this forces them to maximize efficiencies through harnessing new technologies and innovation. Innovation can either be an overnight game changer or deliver incremental improvements which enhance productivity and efficiency for oil and gas companies. Both are vital to a long-term sustainable profitability. Nevertheless, innovation is not cheap and not easy to achieve. It requires not only smart employees who engage in internal activities, but also

support and execution from external partners such as service providers. In the oil and gas sector collaboration is especially important due to the high costs and long lead times associated with oil and gas advancements. Collaborative projects between oil and gas companies, oil field service operators and strategic partners, suppliers or universities are becoming the norm rather

than the exception. In the oil and gas sector, innovation crosses the entire company. R&D is important around technology and business systems and processes for upstream companies, and around products and services for downstream companies. But it is also important to look for opportunities to grow in areas such as business models and the supply chain.



3. The effects of formal governance on innovation

Defining formal governance and contracts

Incomplete information and information asymmetry prevent firms from writing detailed contracts when outsourcing activities to govern their relationships with external partners. These information problems are seen as sources of costs that motivate organizations to vertically integrate and make the products and services themselves rather than buy them. However, to survive in a low oil and gas environment and sustain competitive advantage, oil and gas companies have started to engage in hybrid organizational forms (e.g., alliances, preferred supplier arrangements, outsourcing and joint ventures) that combine the advantages of outsourcing with the control and oversight of vertical integration. Thus, when vertical integration is not feasible or economical, and when buying from the market cannot meet demands for customization, coordination, and collaboration, oil and gas companies opt for engaging in hybrid organizational forms with external partners and service providers. In order to manage, govern and successfully execute these external partnerships, formal controls (i.e., contracts) are used. Contracts are legal institutional frameworks that specify the obligations of both parties, such as roles, responsibilities, performance expectations, payment terms, monitoring clauses, and dispute resolution procedures. As such, contracts reduce the uncertainty faced by firms and the risks stemming from opportunistic behavior of one or more contracting parties. In addition,

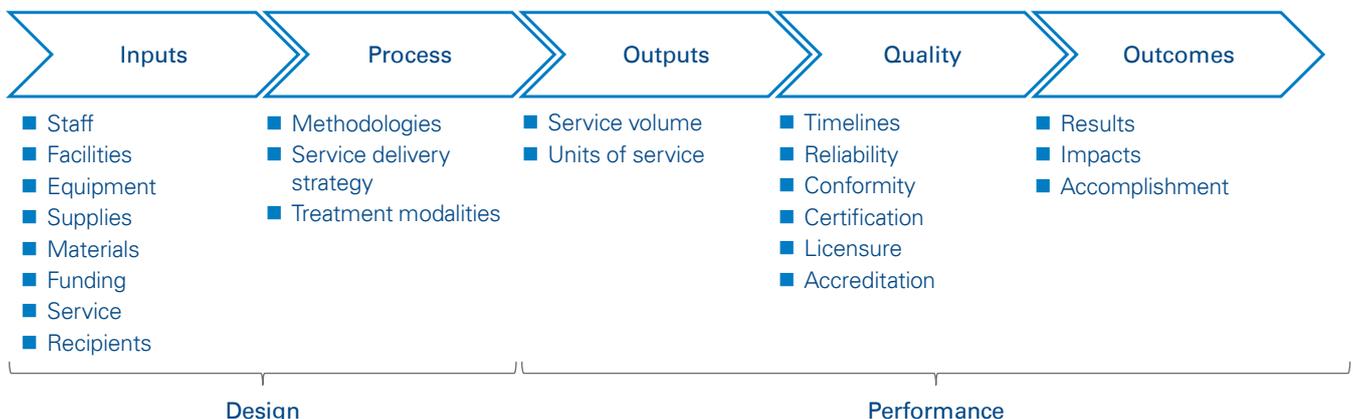
contracts serve as a method for coordinating the collaboration by mitigating the risk that misunderstandings will disrupt the collaboration among the parties.

Types of contracts

There are three main and commonly used contract types in the oil and gas sector, including cost-plus contracts, fixed-price contracts and outcome-based contracts (performance-based contracts). Each contract type carries inherent risks and rewards for both parties (the oil and gas company and the external partner), and each contract type is focused on the input, processes, output, quality and/or outcome of the transaction.

Cost-plus contract refers to a contract in which the price to be paid to the external partner is based on the actual cost of production/delivery and any agreed-upon rate of profit or fee. The main benefit of a cost-plus contract is the ease of calculation. Although there are several calculation methods to determine the costs and pricing, the common thread includes the cost of the product/service and adds a profit amount. In addition, little information is required to use this contract type since the price changes dependent on the costs as the delivery of the product/service progresses. An oil and gas company that uses cost-plus contracts can justify price increases when costs rise. This method provides an easy and convenient way for businesses to

Figure 5: Focus of types of contracts



Source: Adapted from Martin & Kettner (1996). Measuring the performance of human service programs. Sage Publications

set product pricing. Cost-plus pricing ensures that the provider is shielded from unexpected costs. However, cost-plus contracts largely ignore the role of buyers. If a buyer places a higher value on a product than the set price, the business loses out on profits. Accuracy is a critical component in cost-plus contracts. This contract relies on variable cost and sales estimates; if either of these estimates is inaccurate, then the cost structure is also inaccurate. This contract type also requires that business overhead is estimated accurately. Providers have little incentive to reduce or control costs because as costs rise, revenues/profits increase, resulting in the buyer paying a potentially inflated rate for a product/service.

Fixed-price contract refers to a contract in which both parties have agreed on a fixed price to be paid to the external partner for the product or service it delivers. In most cases, bargaining/negotiation on the price after the contract has been signed is not permitted. The price is held constant regardless of the cost of production. The biggest advantage of a fixed-price contract is that it allows the buyer to set an exact budget in advance. The buyer is aware of the total costs before the project starts. The fixed-price model typically limits the number of changes that occur during the delivery of the product/service. The seller is able to charge a high upfront cost under the fixed-price model. Once the price has been agreed upon, the buyer does not face uncertain surprises or need to contest the amount owed. As this contract type requires detailed knowledge of the costs and price of the delivery of the product or service, the contract is

usually written in detail regarding pricing, costs, processes, roles and responsibilities, and inputs. However, fixed-price contracts are less flexible for managing changes or new requests. Any new requirements that arise during the execution may lead to price renegotiation and changes to the schedule. Excessive focus on maintaining a fixed price may come at the expense of quality, creativity and timeliness, and the value of the work often becomes less important than the price. A fixed-price contract may cost the buyer more than anticipated if the transaction is completed early or materials cost less than estimated. Both contract types, cost-plus and fixed-price, focus on detailing the inputs and processes required to deliver the product/service.

Performance-based contracts (PBCs) underline the output, outcome and quality of the product/service rather than prescribing how it is delivered or which resources to use, and may tie at least a portion of the external partner's payment to its accomplishment. An important element in PBCs is therefore the clear separation between the buyer's expectations (i.e., performance goal) and the external partner's implementation (i.e., how it is achieved). PBCs are typically characterized by a relatively low degree of contractual detail as the focus is on the external partner's outcome and a high degree of partner rewards being linked to its performance. Hence, the organization is dependent on the provider and has interest in choosing the "right" external partner. In PBCs, the overall compensation to the external partner, consisting of the base price and an incentive, may be higher, because the risk has shifted to the

Figure 4: Summary of types of contracts

Contractual elements	Cost-plus contract	Fixed-price contract	Performance-based contract
Contractual detail	<ul style="list-style-type: none"> High 	<ul style="list-style-type: none"> High 	<ul style="list-style-type: none"> Low
Payment schemes	<ul style="list-style-type: none"> Costs plus a profit or fee markup 	<ul style="list-style-type: none"> Pre-determined fixed price based on inputs and processes 	<ul style="list-style-type: none"> Based on output, quality and outcome
Advantage	<ul style="list-style-type: none"> Easy to draw up the contract as little information is required to detail the contract Ease of calculating price/costs Providers are shielded from unexpected costs 	<ul style="list-style-type: none"> Buyers are shielded from unexpected costs Allows the buyer to set a budget in advance 	<ul style="list-style-type: none"> Goal alignment between both parties Allows freedom to the external partner to deliver the product/service as it sees best Requires little information and knowledge on the inputs and processes needed
Dis-advantage	<ul style="list-style-type: none"> Ignores buyer's role Need to accurately measure costs and sales estimates Providers have little incentive to reduce or control costs Misaligned goals between both parties 	<ul style="list-style-type: none"> Limits the number of changes that occur during the delivery of the product/service Requires detailed knowledge of the costs and price of the delivery of the product or service Less flexible for managing changes or new requests 	<ul style="list-style-type: none"> Buyer is highly dependent on the external partner's knowledge and expertise Requires detailed knowledge of the required outcomes Requires the ability to accurately measure outcomes
Risk	<ul style="list-style-type: none"> Buyer bears most of the risk 	<ul style="list-style-type: none"> External partner bears most of the risk 	<ul style="list-style-type: none"> Risk is shared between both parties
Goal alignment	<ul style="list-style-type: none"> Misaligned – buyer wants to keep the costs as low as possible and the provider wants to increase them 	<ul style="list-style-type: none"> Misaligned – provider wants to keep the costs as low as possible/buyer wants to receive the product/service within a certain timeframe and with good quality 	<ul style="list-style-type: none"> Aligned – both parties want the same output, quality and outcome

Source: Various publications. Please refer to the reference list at the end of this viewpoint

partner and premium is explicit rather than absorbed in the owner's operating expenditures. The main benefit of a PBC is that it allows freedom for the external partner to deliver the product/service as it sees best. This results in more freedom for the external partner to engage in innovative activities as the partner is stimulated to lower its costs. In addition, this contract requires little information and knowledge on the inputs and processes required to deliver the product/service. However, it is extremely important to detail and measure the outcome/performance of the external partner.

Effects of performance-based contracts on innovation in the oil and gas sector

PBCs are increasingly being used for the effective and cost-efficient sourcing/outsourcing of business services and integrated product-service offerings. A well-known and early example of a PBC is Rolls Royce's "Power by the Hour" contracting type with the US government, in which Rolls Royce is compensated for the availability of the aircraft engines it maintains, rather than for the labor and spare-parts costs associated with the maintenance activities. In the oil and gas sector an example of a PBC is Diamond Offshore's and GE's performance-based subsea blowout preventer agreement, in which GE holds full accountability for performance. Diamond Offshore's Pressure Control by the Hour™ model includes performance incentives to reduce downtime and improve system reliability for Diamond Offshore and its customers. Under the arrangement, GE Oil & Gas will provide "engageDrilling™ Services" for Blowout-preventer (BOP) systems on Diamond Offshore's four sixth-generation drill ships, including management of maintenance, certification and reliability. The BOP systems included in the contractual agreement will be owned by GE. The performance is guaranteed through payments tied to the rig's activities and BOP performance. This model shifts capital expenditure up front, with GE taking on more of the risks and burden. In this case, the external partner (GE) has the leeway to benefit through integration, optimization, and performance improvements, while defining the outcome in a way that directly aligns with the overall project. PBC contracts give oil and gas external partners the flexibility to manage execution details. This is contrary to the prevailing practice in the oil and gas industry in which control is retained by specifying execution requirements and material supplies in great detail. Performance-based contracts have two key characteristics which determine whether the external partner engages in innovative activities. First, the extent to which processes and behaviors are specified in the contract (i.e., contractual detail), as PBCs may contain detailed descriptions of outcome indicators and how they should be measured. Second,

PBCs reward external partners based on the extent to which contracted performance is actually achieved.

Effects of contractual detail on innovation

When contracts are less detailed, and hence faced with less rules and obligations, the focus is more on the outcome than the process of achieving that outcome. As a result, partners have a certain degree of freedom to conduct their work in the way they think is best. A less detailed contract allows the external partner more freedom in decision-making regarding the delivery of the product/service. The external partner can, thus, choose which activities to engage in and which resources to use at its own discretion. As such, for contracts that are characterized by less detail, external partners have a higher degree of autonomy. To ensure that external partners engage in innovative activities, they should not be constrained by contractual rules and obligations. Thus, by granting external partners autonomy, the degree to which they can shape and influence their activities increases and they can quickly respond to changes. This autonomy therefore allows the partner the freedom and flexibility to initiate innovative activities.

All contracts are, to a certain extent, open. Within the range of open contracts, however, there is further variation: the precise degree to which a contract is open may vary across the range of open contracts. As such, contractual openness may be high, or even very high. A very high degree of contractual openness also paves the way for opportunistic behavior (e.g., to seek personal interests at the expense of the collaborative interest, as it results in too much autonomy for the external partner). When autonomy is very high, even the most reliable partners might be tempted to act opportunistically. Opportunistic behavior in the context of open contracts include, e.g., preparation of own competitive activities or selling the generated knowledge to a competitor. Hence, a very high degree of autonomy harms the overall quality and performance of innovative activities. Therefore, there is a certain inflection point at which adding further autonomy proves to be negative.

In sum, although a certain degree of autonomy of the contract is important to make the external partner engage in innovation, too much contractual openness creates a context that stimulates the external partner to act opportunistically by focusing on its own individual objectives, thereby negatively affecting innovation.

Effects of payment schemes on innovation

When contracts are too open, the external partner has the opportunity to engage in opportunistic behavior. As noted above, curbing opportunism by detailing the contract is not considered

to be a solution, as such measures will stifle innovation. To illustrate, by incorporating control and coordination mechanisms the contract will explicitly prescribe roles and obligations, determine the content of the transaction, and specify rules for violating contractual agreements. This obviously hinders innovation by setting the stage for a more rigid collaboration and relationship. Furthermore, extensive control and coordination mechanisms may hamper information exchange between the parties due to clear specifications of what is and is not allowed. Finally, increased control and coordination mechanisms can be considered a sign of mistrust, resulting indirectly in a barrier to knowledge transfer. Hence, balance between autonomy and appropriate control and coordination mechanisms is crucial for a successful partnership. An alternative approach to curbing opportunism, while at the same time allowing a certain degree of freedom in the contract, is to implement payment schemes by using compensation systems in which the external partner is paid based on the performance it delivers. In such cases, the

rewards of the external partner are linked to its performance through incentive schemes that specify performance goals. In case rewards are only linked to specific behavior or the use of certain resources, partners tend to engage only in activities that are explicitly rewarded, and not in others (such as innovation). In the most extreme case, any new initiative would even be a breach of contract. On the other hand, in case rewards are clearly linked to overall performance, partners have more incentives to engage in unspecified activities that allow them to gain higher performance levels. In this case, innovative behavior is stimulated. Hence, when a partner is paid based on performance, it will exhibit activities in favor of reaching the contracted performance; it will find new and improved ways of delivering the performance to maximize its returns. As such, linking rewards to performance will direct the behavior of the partner towards collaborative goals even when it is faced with contractual openness and could behave opportunistically.

Conclusion

Collaboration with external partners is crucial to accelerating technology advancement, streamlining specifications and enhancing solutions that meet the challenges of the current oil and gas environment and position these companies to thrive in the future. Having a system in place to reward the external partner's creativity for achieving performance and targets encourages innovation and creates an environment conducive to continuous improvement. When collaborating with external partners, oil and gas companies can use contractual governance to stimulate innovation. In order to achieve this, oil and gas companies should take into account to following:

How oil and gas companies can use contracts to stimulate innovation with external partners:

Oil and gas companies should emphasize three important stages of engaging with external partners when they want to stimulate innovation: the partner selection **phase**, the contract design **phase**, and the contract execution **phase**:

- In the **partner selection phase**, organizations should select partners with the right risk attitude towards engaging in innovation. Hence, there should be a sound partner evaluation and selection process incorporated prior to contracting the partner.
- In the **contract design phase**, both parties should not consider contracts only a safeguarding mechanism. Rather, they should realize that the way they structure the contract also has an effect on outcomes such as innovation. Depending on what type of innovation they want to achieve, they should carefully select a certain contract type and design the degree of contractual detail and the partner's reward scheme.
- In addition, during the contract design phase, it also becomes important to involve not only legal specialists, because important knowledge regarding roles and responsibilities to include in the contract often resides outside of the legal department. Lawyers are less likely to be a crucial part of the relationships that develop at the operational level, and thus less likely to have the knowledge possessed by the employees who are involved in the day-to-day operation of the service delivery. Thus, both parties should also involve employees who will be involved in the day-to-day operations of the service delivery. Thus, both parties should also involve employees who will be involved in the day-to-day operations of the service delivery. As these employees are in the position to actually grant the autonomy to the external partner as stipulated in the contract, they should know how the contract is designed and live up to what is agreed upon during the **contract execution phase**.
- Finally, when a less detailed contract is used with an external partner, the soft elements of the relationship, such as trust, communication and commitment, become important during **all stages**. Both parties should make sure that there is a good relationship underlying the partnership at the strategic, tactical, and operational levels. It is also important that the formal and informal communication between the parties is set up well, not only to tighten the relationship and increase trust, but also to assure that both parties know each other's business so mutual understanding and knowledge sharing can take place.

ADL facilitates your innovative potential in the oil and gas sector

Arthur D. Little is uniquely positioned to support the oil and gas sector in:

- Developing and implementing innovation strategies
- Identifying and implementing innovation contracts
- Identifying possible partners and negotiating terms and conditions of contractual service agreements between parties
- Reorganizing the oil and gas sector and oil and gas companies
- Identifying growth plans for new companies or projects
- Identifying oil and gas business models

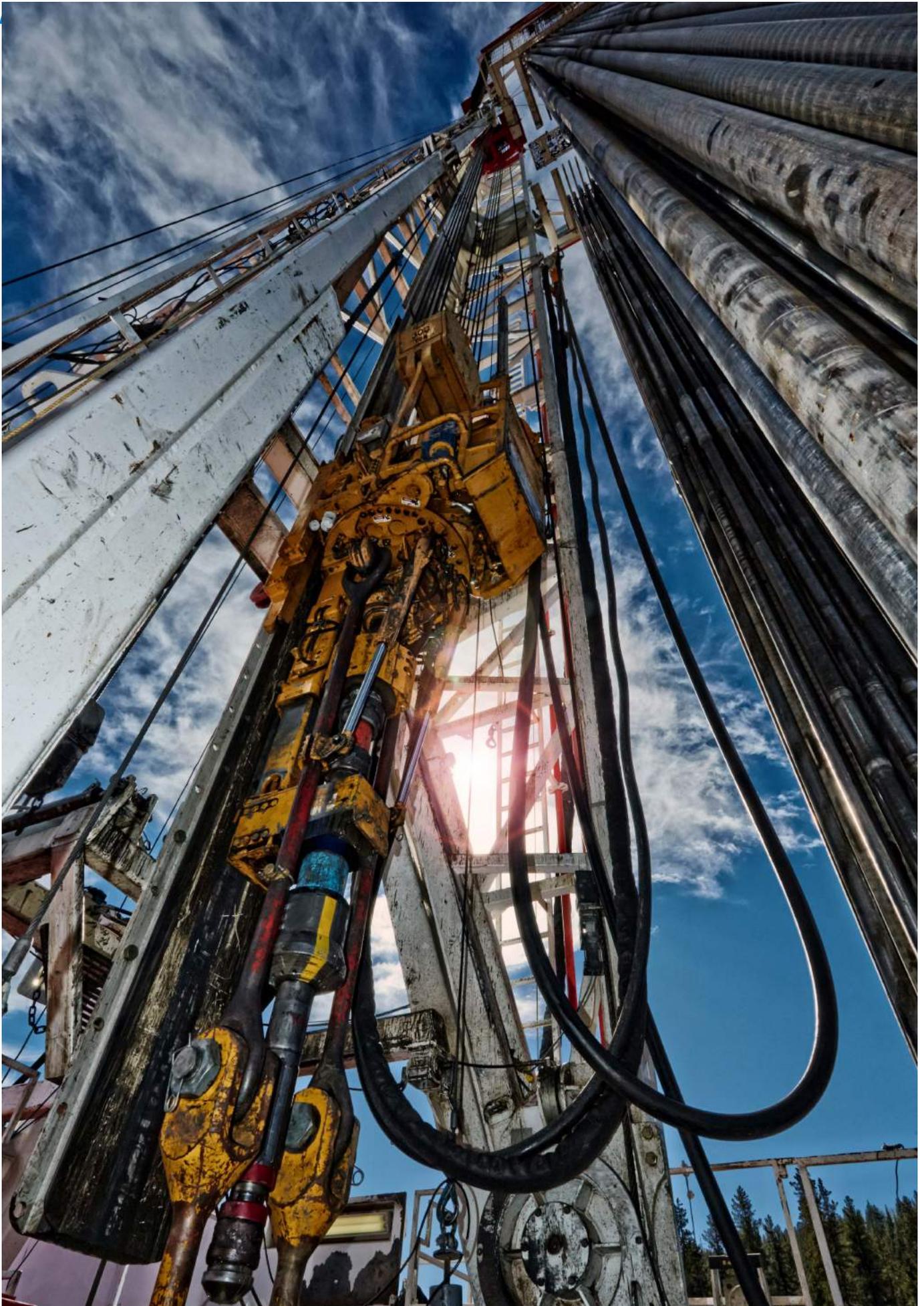
We have extensive project experience in linking strategy, innovation, and transformation in the oil and gas sector. Our internal experts combine extensive oil and gas experience with local insight and industry expertise.

Our extensive network of external experts ensures that each client will leverage the best-possible expertise, in line with the challenges and the context the company is facing.

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Innovation through contracting in the oil and gas sector – How contracts with external partners drive innovation in the oil and gas sector

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