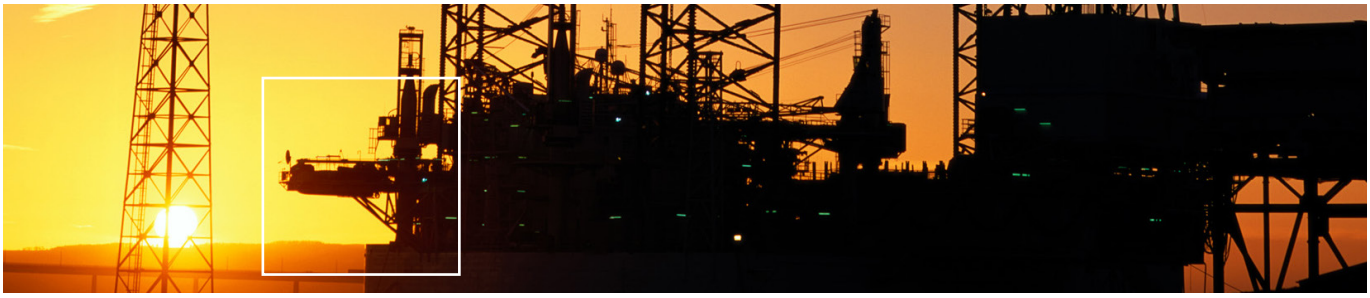
Technology Application in Mid-Sized Oil and Gas Companies

Helping E&P Companies to Better Results by Improved Use of Technology



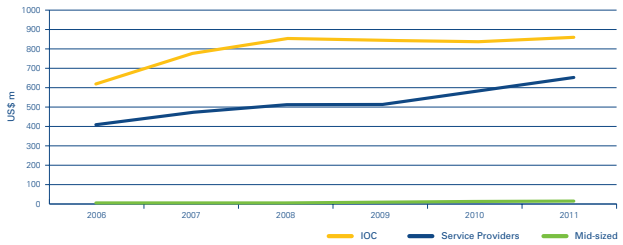
Mid-sized upstream oil and gas companies have traditionally been less involved in R&D efforts than the large international oil companies. Some of these mid-sized companies, as a result, are quite exposed, in some respects, to levels of support provided by service and equipment companies, whose capabilities are not always attuned to the asset needs of any one particular business. Arthur D Little has supported a number of these E&P companies in generating maximum value from the R&D spend that they do make and ensuring that that their technology strategies are well aligned with their business strategies. In reviewing a selection of such mid-sized oil and gas Exploration and Production companies, all international in scope, we find that those with more proactive approaches to the adoption and absorption of technology, particularly when such a stance is matched with relatively focused business and asset strategies and with moderate or even strongly developed technology management processes, such as those introduced by ADL, can be seen to yield demonstrably better business performances. This suggests that improving technology strategies and strengthening technology management processes can bring substantial benefits to the business performance of mid-sized oil and gas Exploration and Production companies, expressed in both cost and resource replacement terms.

Most of the large International Oil Companies (IOCs) and most of the major service providers go to great lengths to present their investment in R&D and to explain how this investment supports their corporate strategy and drives their Exploration and Production (E&P) success. However, there is much less discussion about the role of technology in supporting strategy and performance for the mid-sized upstream oil and gas companies; an area in which Arthur D. Little has supported a number of clients worldwide.

Such mid-sized E&P players have a range of options for using and accessing technologies, with some making considerable investments in this area and others relying only on their access to commercially available technology from third party providers. These choices affect the delivery of corporate strategy and can have a substantial impact on business performance.

A high and growing level of R&D spend has, of course, always been critical to the oil and gas service companies, as shown in Figure 1, with the large international oil companies also making high and increasing levels of R&D investment. By contrast, the mid-sized companies, even when their size is taken into account, spend only relatively very small and constant amounts on R&D.

Figure 1. R&D investment by selected IOCs, mid-sized companies and service providers



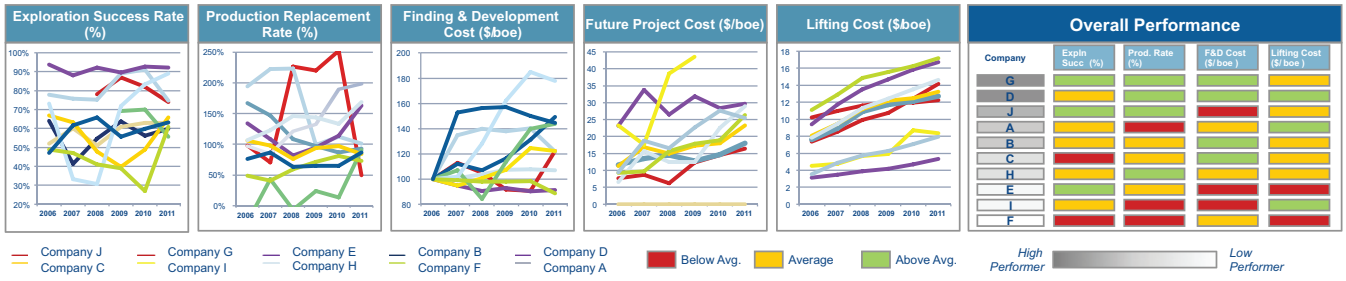
Source: IHS Herold, company reports, ADL analysis, where data has not been reported we have estimated spend based on previous years

However it is our experience that some of these mid-sized players have become overly dependent on service providers, to the extent that their business strategies are being constrained by them. This is now causing a number of them to assess their approaches to technology in more depth.

Reviewing performance

To investigate further the approach of these mid-sized E&P companies to technology investment Arthur D. Little has reviewed a benchmark

Figure 2. Factors taken into account in developing an overall view of performance for mid-sized E&P players



Source: Arthur D. Little analysis, 2013

peer group of ten such businesses, all international in scope. We evaluate their performance in terms of exploration, production, finding and development costs, project costs and lifting costs to develop an overall view of their relative business performance (Figure 2)

Business strategies and technology strategies

To place this initial analysis into context, when assessing the performance of a client in this manner, we then examine its asset portfolio and its corporate strategy to clarify its key business drivers, assigning it to one of four main Business Strategy categories (Figure 3). This defines the factors of greatest importance to the company (e.g. wildcat explorers will place particular emphasis on exploration performance whilst mature asset specialists will focus on operating costs, etc.). Our company sample includes a broad range of strategies, with two companies adopting a mini-major strategy; two pursuing wildcat exploration; four mature asset specialists and one balanced independent.

A further key step in our assessment of company strategies is then the evaluation of their approach to accessing technologies, categorising their technology strategy (Figure 3) based on the role that technology plays in the company. Arthur D. Little applies a suite of distinct Technology Strategy categories, each defined by formal metrics that it has developed, which it applies in these analyses. Half of our peer company group are Proven Implementers of technology. They access and deploy commercially available technologies only when these are proven (and de-risked) and use technology to maintain performance but they do not make particular efforts to obtain commercial advantage through use of technology. The other companies show a more aggressive and strategic attitude towards technology, with one company being a Selective Technology Leader with a track record of developing in-house technology and the other companies being Intelligent Adapters (i.e. early take up and internal mastery and improvement of technology) or First Adopters (i.e. early take up of technology). Ensuring that a company's current Technology Strategy is reliably assessed is an important aspect of deriving recommendations for improved performance.

Technology delivery

Whichever technology strategy they may have adopted however, these mid-sized companies then also take a wide range of approaches towards both resource inputs and

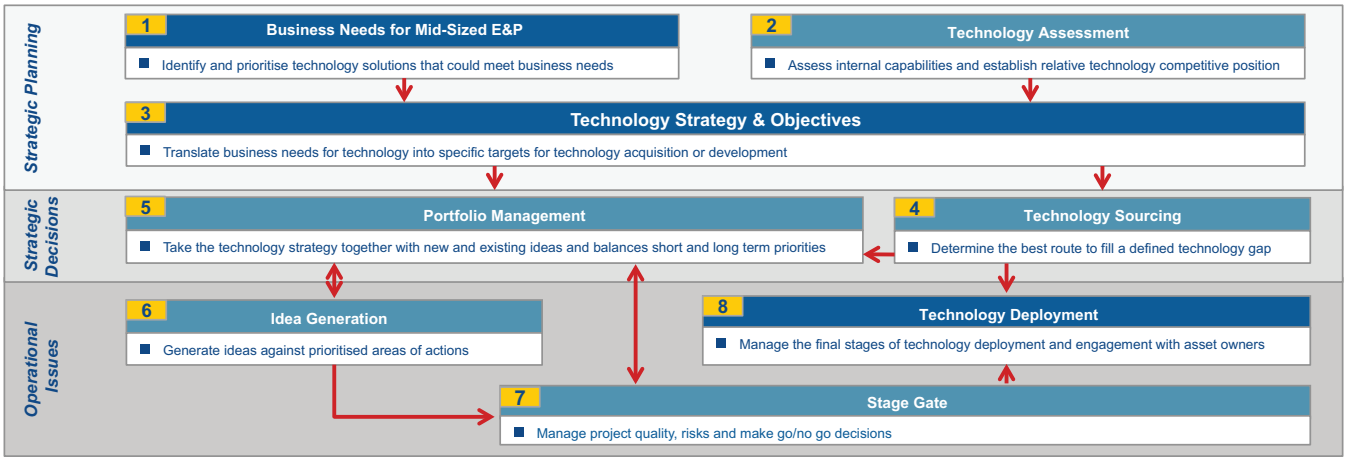
Figure 3. Business and technology strategies of our mid-sized company peer-group

Business Strategies	
Mini-Major	Large diverse portfolios, presenting a wide range of technical challenges. Company A is dominated by its mature existing assets position, and the IOR challenges that presents, but is determinedly accessing a wide mix of other resources. Company D is more focussed on gas opportunities but is still very widely spread both geographically and in terms of plays
Balanced Independent	Re-focus into a core of unconventional resource in North America, while still retaining a large mature resource base in the North Sea with low-risk step-out opportunities, and growing positions in SE Asia (Company E) and West Africa (Company G)
Mature Asset Specialist	Whether by design (Company B, Company C) or by default (Company F, Company I) these companies are all dominated by mature to hyper-mature assets. All companies also maintain a strong exploration program but this tends to be mostly for relatively lower-risk step-out opportunities
Wildcat Explorer	Clear focus on exploration. Company J has successfully concentrated on higher-risk wild-cat plays on the African margins. Company H has spread its activities across a wider mix of plays, including Nth American unconventionals

Technology Strategies	
Selected Technology Leadership	Selective technology leadership, a first applier in areas of key business challenge
Intelligent Adapter	An intelligent adaptor" or "fast applier" of co- developed service company technologies
	Focused excellence in application & improvement
First Adopters	A "find & apply" first adaptor of service company technologies
	A "first adopter" or "fast applier" of co-developed
Proven Implementers	Generally an "aggressive implementer" of proven, (sometimes new) technologies
	Find & apply off-the-shelf products and services
	Deploys proven (sometimes emerging) technologies using labs to guide decisions
	No clearly articulated strategy, only find and apply as needed
	Deploys partner supplemented self-developed technologies

Source: Arthur D. Little Analysis, 2012

Figure 4. Core technology management processes in E&P



Source: ADL knowledge base, 2012

technology management processes, achieving in turn an array of different technology outputs, each of which may then in turn be linked to eventual operational performance.

We review the levels of R&D spend and numbers of R&D staff deployed by each company to assess the inputs available to each company, and then assess the technology processes applied to deploy these resources, in order to produce a perspective on what Arthur D. Little considers to be the eight core technology management processes for an E&P business. Finally, in addition during these assessments, we also review a measure of the level of technology output, as indicated by the number of patents and Joint Industry Projects generated.

Arthur D. Little has developed a suite of eight technology management processes for its clients, as described in Figure 4, and commonly deploys this approach in this type of technology analysis. Amongst these eight processes Business Needs definition (1), Technology Strategy & Objectives (3) and Technology Deployment (8) were found to have the greatest importance for Mid-sized E&P companies.

- Clear Business Needs definition ensures that technology investment is firmly based on operational and business requirements, setting targets to guide all other processes.
- Technology Strategy & Objective setting considers corporate strategy and capabilities to translate these targets into an action plan for technology acquisitions and development.
- Technology Deployment manages the final stages of the action plan to achieve these targets; this is something that even very large, experienced companies often struggle with.

Technology drives performance

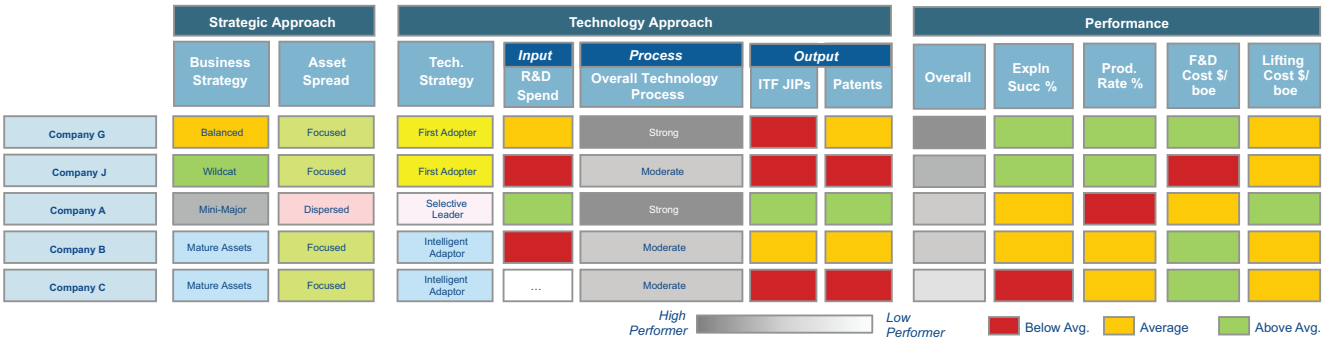
In this particular example, a comparison across the peer-group between business performance, as expressed by the various cost and growth rate metrics examined, and technology performance reveals some very interesting linkages. Whilst there is no uniform, direct and automatic link between business performance and technology capability, there does appear to be a link between business performance and technology application when considered in the light of a company's corporate strategy and asset portfolio. Figure 5 shows a group of companies, all of which have business strategies which differ in terms of the value chain stage concentrated upon but almost all of which are quite strongly focussed in terms of the type and spread of assets involved.

Critically, these companies appear to combine this focused asset approach with a technology leadership strategy which generally involves being either a first or intelligent adopter of new technologies. This is in contrast to the other five companies in the peer-group which have a more strongly dispersed asset strategy and combine this with being passive adopters of technology. The companies shown in Figure 5 all appear to deploy moderate to strong technology management processes, with the result being a level of business performance which varies from generally average to strong. The other five companies in the peer-group (not presented in Figure 5) appear to perform markedly more poorly - all of these are Proven Technology Implementers with weak technology management processes.

Being a passive implementer of proven technologies, within the context of a business strategy involving a dispersed asset spread, may therefore be a predictor of mediocre to poor business performance. By contrast, being a first adopter or intelligent

[1] Company J being essentially an exploration company is not really yet set up for projects and operations hence its overall rating is less influenced by its operations performance whilst Company A's overall rating adjusts for its production replacement rates (which are made difficult by its underlaying assests).

Figure 5. Companies with a more proactive technology strategy tend to perform better



Source: ADL knowledge base, 2012

Source: ADL fieldwork interviews, annual reports, ADL technology management process framework, ADL analysis

adaptor of technologies, when combined with strong technology management processes seems to drive business success in the sector, particularly when applied across a focussed asset base.

We are able to demonstrate therefore that even a moderate capability in technology management processes appears to be sufficient to unlock superior operational performance, even for relatively low R&D investment. Indeed, any potential risks of technology failure perceived by the smaller companies in the group appear to be offset by an "over-installation" of superior technology systems & processes.

Our lessons-learned

For underperforming mid-sized E&P companies one possible route to improvement seems to be to move towards an "intelligent adaptor" or "first adopter" technical strategy, whilst strengthening the internal culture and technology processes required to make this approach work.

Our experience in supporting clients in this area, helping them to understand technology strategy options and the technology process routes to the delivery of business results, suggests that substantial benefits and changes in this area can be achieved. It is often necessary for companies to change their approach to technology strategy and strengthen internal technology management processes to ensure that an identified necessary transition happens promptly and thus translates into measurable improved performance. In particular, such a shift in approach can more strongly leverage a company's technology position across their asset base and give them the negotiating strength to avoid being disadvantaged in their engagements with service companies.

It is ADL's experience that successful translation to a high performing technology organisation can not only serve to reduce project and operating costs but critically can accelerate projects and enable companies to monetise assets in ways that may not otherwise have been possible.

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Arthur D. Little

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