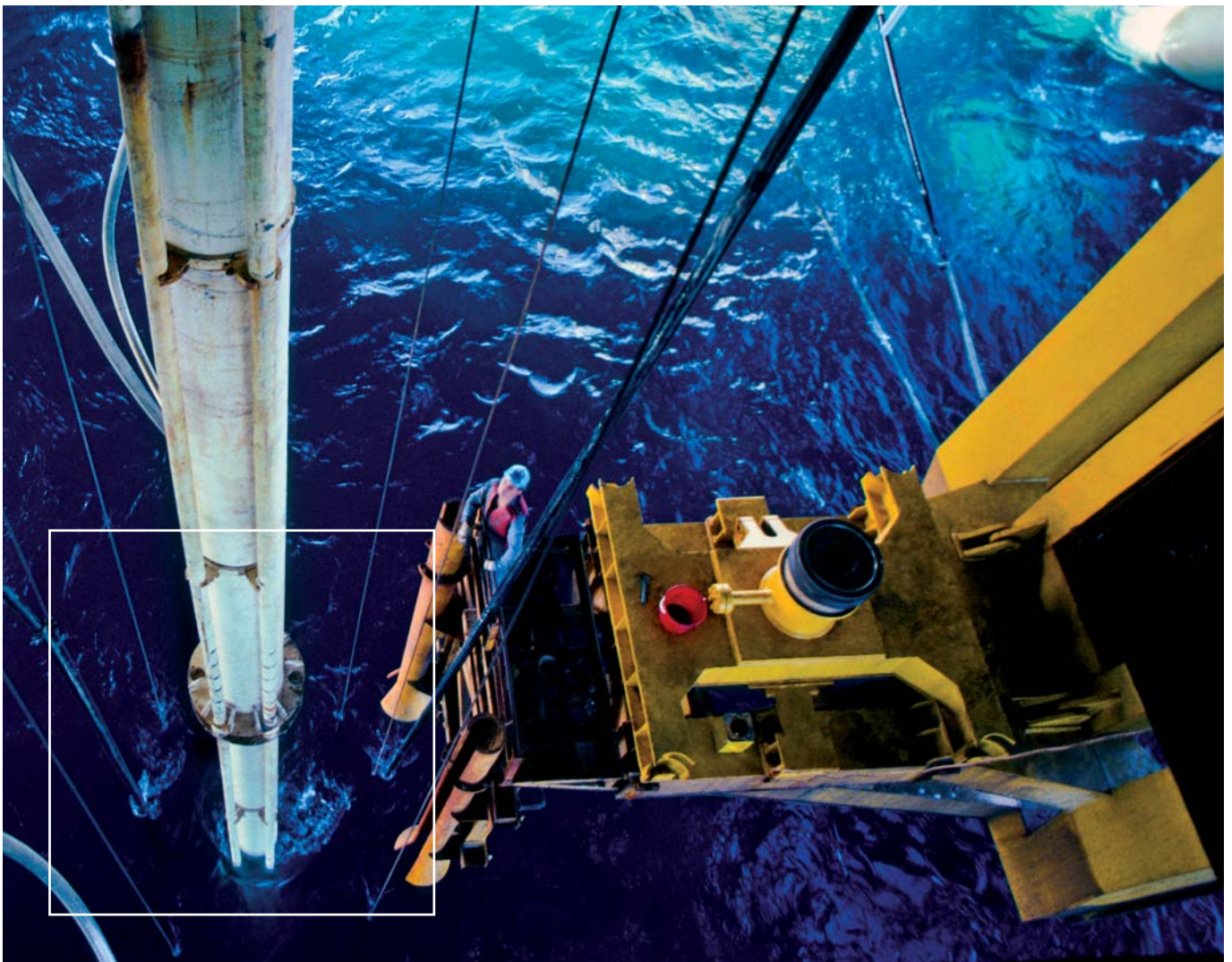


Sunken Treasure

Opportunities and Threats in a Maturing Subsea Market



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Executive Summary

Over the past four years revenues in the subsea oil and gas sector have been growing at an impressive rate. The next five years are expected to bring a period of consolidation and a number of challenges that could present opportunities for companies in the sector.

Globally, the oil and gas industry is facing a shortage of skilled personnel, service company supply constraints and constrained access to raw materials such as steel and cement. The subsea oil and gas sector has not been shielded from these effects and faces a challenging period as it moves to improve reliability of its technology to operate at ever-greater water depths and flow distances.

Arthur D. Little has examined these challenges to understand the opportunities and threats that the subsea sector will face in the next five to 10 years, and to identify three areas of focus most likely may affect future growth:

- The rise of NOC power and its implications on technology development of subsea players.
- Extension of subsea technology into new regions where production is growing rapidly and the impact on current subsea service providers.
- Increased consolidation across the industry

What is Subsea Technology?

The traditional way to extract offshore reserves is via a fixed or floating production facility, with all the equipment needed (pumps, separators, water handling, compressors, processing and storage) located topside. In deep or remote waters however, surface facilities are expensive and space is at a premium, making production from such locations challenging. Subsea technology provides a means to technically and economically produce remote and/or deepwater reserves by placing wellheads and associated mechanical and electrical infrastructure on the sea bed. Production from subsea wells can be tied back to surface facilities or to shore.

In addition to reducing development and production costs (compared to a conventional platform at similar depths), modularised subsea technology can also increase recovery factors by reducing backpressures on wells (e.g. via multiphase pumping or subsea separation).

The first subsea technologies were developed in the 1970s for production at depths of a few hundred meters. Technology has advanced since then to enable production at water depths greater than 2000 m and the industry is constantly extending this reach.

Subsea technology is being rolled out in West Africa, Brazil and Asia as its field of application increases. Maintenance technologies and specialist installation equipment are an important part of this market.

“The key to future growth will be the ability of companies to fully capitalise on the international potential,” said David Pridden former CEO of Subsea UK. At the moment both the UK and Norway are global market leaders, but they risk losing out to the likes of Brazil and the US if they cannot meet the critical demand for suitably qualified engineers and become faster at bringing new technology to market.

Subsea Industry Development

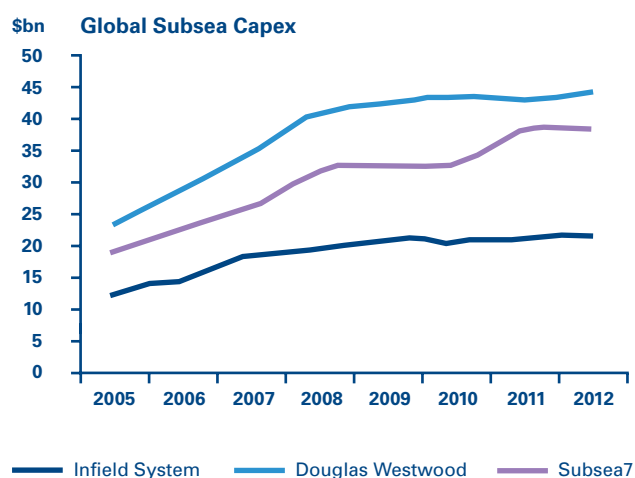
In recent years, the growth of the subsea industry has been driven by the oil price, which has allowed companies to invest in new technologies to access reserves. With fewer easy-to-access fields, exploration activity has been moved further offshore into remote and deeper waters. At the same time the industry has matured to the point where subsea technology is no longer a specialist area. It has become a routine choice, and often the only choice, for many remote or deepwater developments.

Our analysis shows that UK oil and gas production using subsea technologies has risen to over 40% of total production, with most new installations using subsea completions. It is a similar story in Norway, and subsea production from the Gulf of Mexico currently accounts for approximately 20% of total production. There are an estimated 5,000 subsea wellheads installed globally, and the figure is set to rise further.

While there are some variations between subsea investment growth forecasts made by different bodies (Fig.1), there is general agreement that the subsea industry is now stabilising as a result of the labour shortages and capacity constraints in the service sector. Arthur D. Little estimates a UK growth rate of around 5% pa for the next few years; this is in sharp contrast to the recent global subsea investment growth rates and the 26% year-on-year growth in revenues of UK-based subsea manufacturers and service companies over 2005-2007 identified by Arthur D. Little (Fig.2).

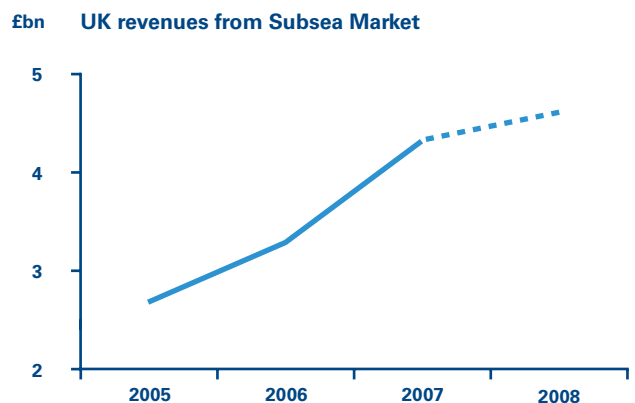
This heralds a shift in the industry with the sector moving towards maturity: cutting edge technology that commanded a premium a few years ago is becoming more widely available. In the coming five years, the industry will face gradually increasing cost competition and pressure to achieve economies of scale. Subsea companies will need to deal with significant challenges in order to maintain their positions.

Figure 1. Growth graphs from multiple sources



Source: ADL surveys 2005-2007, Scottish Enterprise, Douglas Westwood, Infield System, ADL analysis; ADL interviews, Subsea7 presentation at UTC, 2008

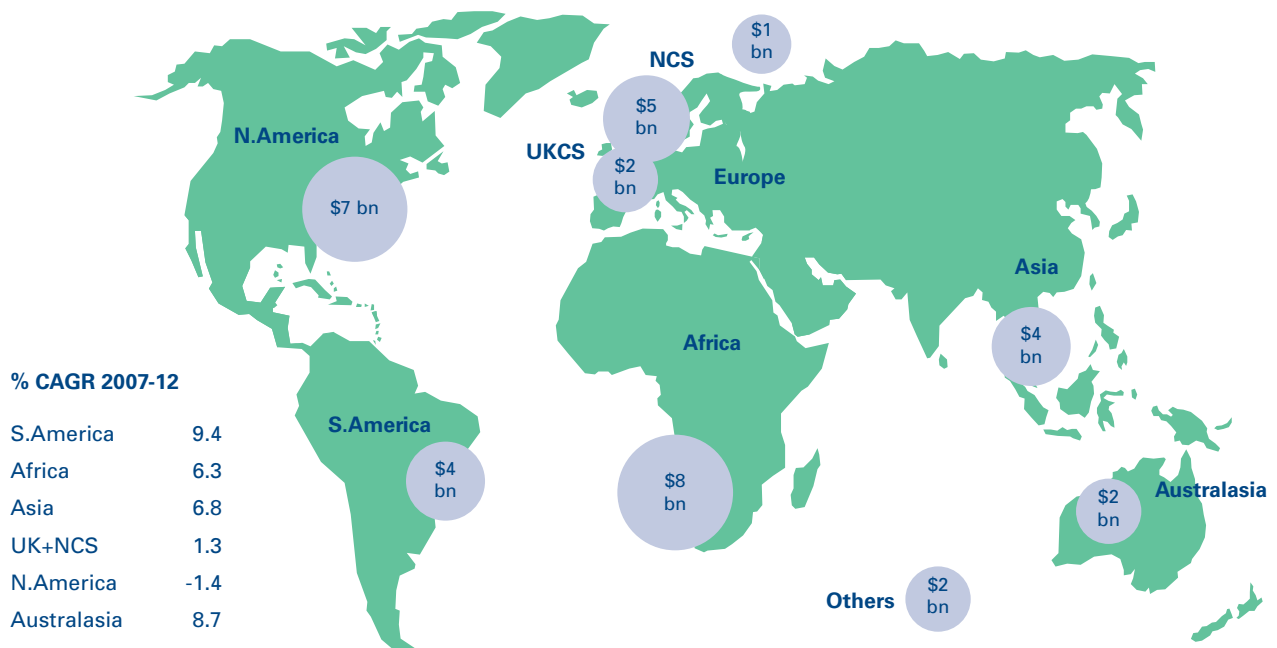
Figure 2. ADL graphs on growth of UK Subsea value added



Source: ADL surveys 2005-2007; ADL analysis

Subsea Industry Development

Figure 3. 2007 Global subsea investment market contribution

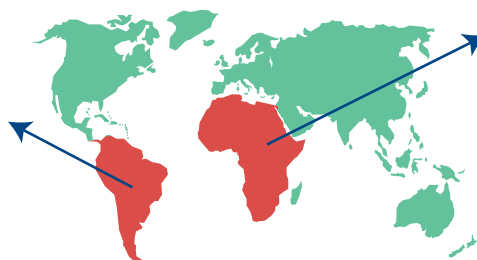


The Subsea global Capex market size in 2007 was around \$35 bn. Our studies for the UK subsea industry show that in the market industry exports around half of its products and services and appears to have maintained its international competitiveness. Given geographical shift in new work-streams to West Africa, GoM, and Asia, Arthur D. Little expects UK and Norwegian exports to increase at a faster rate in the future.

Source: Projections based ADL surveys, ADL analysis of global forecast from Douglas Westwood & Scottish Enterprise 2008, Infield System, 2008

Figure 4. Individual Region Forecasts

Petrobras is the **Latin American** leader in the use of subsea technology. It is expected that drilling activity will strengthen over the next five years. Recent discoveries in Brazil are likely to be addressed beyond 2013 and will strengthen longer-term growth. Petrobras has partially anticipated market constraints and has made significant investments in the long term charter of vessels and rigs.



The **African** subsea market is expected to experience the largest absolute growth of any region over the next five years. This growth will be driven by increased deepwater drilling activity. The subsea sector provides a haven from the security problems associated with operations in Nigeria, and the relative stability of Angola has increased interest in offshore operations, local investments and Joint Ventures to service this market.

Source: Projections based ADL surveys, ADL analysis of global forecast from Douglas Westwood & Scottish Enterprise 2008, Infield System, 2008

Developing Subsea Technology

The NOC challenge

The availability of subsea technology is a key requirement for deepwater and remote developments, and the need for subsea technology will continue to grow. Technology reliability, rather than cost, is likely to remain the most important aspect for all applications in the medium-term. The pace of deploying subsea technology could be affected by the increasing frequency of National Oil Companies (NOCs) taking the lead in developments.

In a survey conducted by Arthur D. Little in 2007, 37 leading UK-based subsea manufacturers, service providers and international oil companies highlighted what they believed would be the key technology growth areas over the coming five to 10 years.

Most respondents expect that subsea processing, long-distance tie-back and electric control systems will be the most prominent growth areas in the next five years, particularly for developments in the Gulf of Mexico, offshore Brazil and West Africa. Operators, in particular, noted the importance of all-electric control systems and associated components, improved reliability, modularity in design and metering to support this¹.

All of these technologies have been developed through collaboration between operators, service providers and manufacturers, such as the Autonomous Subsea Light Weight Intervention (ASLWI) technology (Chevron, Shell, BP, Expro); subsea boosting project (Demo 2000 programme) and wet gas compression pilot (StatoilHydro and Aker)².

These partnerships have helped the industry progress more rapidly than it might otherwise have done by sharing knowledge in technical forums and through joint field development projects, resulting in successful deployment of technology.

How quickly the rollout of these technologies occurs in the coming five years could be affected by capacity constraints on both manufacturers and service companies, as well as any impact from the rising power of NOCs.

Some NOCs increasingly aim to take the lead in subsea developments, striving to reduce the participation of IOCs. It seems likely they will continue to increase their share of global upstream capital expenditure, with lower IOC participation.

Whilst NOCs may invest in their own research in the future, to date a large proportion of them have lacked the the “learning curve” knowledge that the industry leaders (such as StatoilHydro, BP, Shell) have developed over the last decades. This will place NOCs in the position of wanting to “go it alone,” but needing an IOC or contractors’ subsea expertise.

This could create opportunities for subsea service providers and manufacturers to provide additional services to NOCs. However, new collaborations will be needed and these will take time to develop. Further, they will not make up for the loss of hands-on subsea operating experience that IOCs (and some NOCs) have to offer. In a period of subsea sector consolidation, some NOCs that have not invested in subsea R&D will need to review their technology strategies if they are to gain access to these technologies.

¹The interview list included manufacturers and contractors making up 80% of the UK market in revenue terms.

²Subsea structures, wellheads and intervention technologies were also noted as important growth areas though to a lesser extent.

New Subsea Provinces

The threat of increased demand

Although the main growth regions are reasonably well understood, there is significant uncertainty about medium-term Asian demand for subsea technologies.

Steve Sasanow the chairman of the 2008 Underwater Technology Conference suggested that “we might expect to see Chinese manufacturers of subsea hardware in four-five years time”. Chinese manufacturing would have a significant impact on the industry.

The Asian subsea market was valued at around \$4 bn in 2007. Forecast investment growth in the next five years is strong with major subsea pipeline investments and oil and gas field developments planned in the region.

Uncertainty in the growth forecast arises from potential developments in the South China Sea, a region rich in oil and gas and reserves. The oil and gas industry has seen increased activity in the region such as successes in oil exploration by Devon, Anadarko, CNOOC and recent exploration cooperation agreements between China, Philippines and Vietnam. Additional demand for subsea production technology emerging from this activity has not been included in current forecasts.

International companies are investing in local manufacturing capacity in the region, and this is expected to rise to support the increased activity. Arthur D. Little also foresee new local market entrants toward the end of the period (2011 onward), providing options for business partnerships between established international players and new localized companies.

Partnerships between international and new local players (operators, service companies and manufacturers) could bring about challenges around information sharing and intellectual property issues, meaning that consideration will need to be given as to how business is conducted competitively in the region. Protection of intellectual property rights will be important in the subsea sector, as in all others.

Subsea Sector Consolidation

The fight for market share

There has been a trend towards consolidation in the industry, and Arthur D. Little's recent study for Subsea UK highlighted the potential of opportunities for mergers and acquisitions. Arthur D. Little forecasts further consolidation across the industry.

A study for Subsea UK highlighted that consolidation might be necessary to integrate service delivery, to access new distribution networks and to exploit economies of scale to deal with escalating material costs. Companies involved in recent mergers report that synergies have come from:

- economies of scale to deal with increasing project size and higher material costs
- increased global footprint
- increasing market share
- sharing existing customers
- taking out the competition

In a maturing market, leading players will want to maintain or increase their market share to strengthen their position and reduce their cost base in the face of potential future competition. There appear to be opportunities to consolidate, particularly with the smaller players such as small vessel owners on the service side, and on the manufacturing side in the Subsea Umbilicals Risers Flowlines (SURF) sector. Additionally, with the current capacity constraints in the industry, some of the IOCs and NOCs must consider forward integration or joint ventures to strengthen their project development capabilities and overcome existing industry bottlenecks.

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Conclusion

Further growth if capacity constraints can be overcome

The subsea sector is maturing and this will change the key success factors within the industry, with market share and access to subsea resources becoming increasingly important. The subsea sector's growth rate is likely to slow substantially due to capacity constraints. However, a number of companies, particularly those in the service and manufacturing chain, will outperform, so it is important that investors in the subsea sector develop an accurate understanding of revenue drivers.

The changing position of NOCs could be an important factor in the development of the subsea industry. Those NOCs without subsea expertise will need to review their technology strategies and find ways to access the needed capabilities, especially in new growth areas. These new provinces could bring additional pressures on scarce supply in the short term, but more competition in the longer term as new entrants emerge.

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Arthur D. Little anticipates increasing competition between private investment firms and integrated service companies to acquire subsea service companies. Mergers and acquisitions will also provide obvious avenues for gaining market share and there are opportunities for consolidating parts of the industry. Finally, implementing cost reduction programmes will become more important in the medium term.

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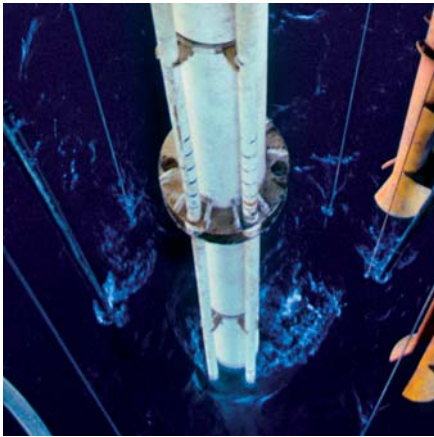
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Reaching New Depths

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