

Room for improvement

Damon Evans talks to Matthias Bichsel, former director of projects and technology at Anglo-Dutch supermajor Shell about the prospects for innovation and collaboration in the oil and gas business

MATTHIAS Bichsel, who retired from Shell earlier this year, is a strong believer in open innovation and collaboration.

For Bichsel, who enjoyed a career at Shell spanning more than three decades, collaboration with companies outside the oil and gas business offers huge potential – and the energy industry is realising this.

In 2009, he reorganised Shell's technical development department to "radically open up" whom the company would collaborate with to take advantage of new opportunities, particularly within the information technology (IT) sector.

Working together with the IT industry can help boost the power of technological innovation in areas where the oil and gas business has become complacent, for instance drilling techniques or improving recovery rates from a reservoir.

A new mindset

High oil prices tend to camouflage inefficient operations, but the oil price collapse has forced companies to rethink their methods and business models. It's not about spending huge amounts on research and development, but about understanding the knowledge at hand and pushing the envelope a little bit harder, Bichsel told *Petroleum Economist*.

He is alluding to an oil company's ability to get more out of a reservoir while reversing the rate of declining production. Historically, recovery rates average between 20-40% over the life of a field with a traditional well declining at a rate of 6-8% per year, data from consultancy McKinsey shows.

Grappling with declining production is a big challenge for the industry. Oil companies typically invest about half of their capital spend – last year's total capital expenditure was in the region of \$800 billion to \$900 billion – on arresting field declines.

"It's still being done in the way that it has been since I started my career in the oil patch in 1980. A lot of catch up is possible," reckons Bichsel.

That's partly because individual oil companies have tended to jealously guard their trade secrets and shied away from tackling the industry's challenges together or with help



from companies outside the sector. But "data is really valuable to oil companies ... knowing how a field works or how a reservoir behaves is an incredible asset, which is actually more valuable than a patent on some gizmo that measures pressure in the well," adds Bichsel.

With help from the IT sector, more advanced sensor networks will provide huge amounts of useful data, while newer automated operating techniques will boost petroleum recovery.

Indeed, the successful oil company of the future will cut the rate at which production from a well declines to between 1-2% per year, while recovering some 60-70% of the oil in a field, predict McKinsey consultants Stefan Heck and Matt Rogers in their book *Resource Revolution*.

The energy business is simply behind the curve compared to other industries, such as aviation, in terms of using IT applications to monitor equipment, build facilities and interpret what exactly is happening in the petroleum reservoirs.

For instance, the aviation industry can remotely monitor every engine on an aircraft in order to efficiently carry out effective preventative maintenance. For its part, Shell is busy hooking up sensors to all of its equipment – to rotating equipment, pumps and compressors, for example – to actually glean the behaviour of its kit.

In the past, engineers typically went into the field once every six to 12 months to test various flow parameters. These days, with the help of innovations in IT, operators are running fibre optic cables, that can measure virtually anything – temperature, pressure, sound or flow along the well bore – at any time, which yields huge amounts of instantaneous data.

But all this data crates a lot of noise, so it's important to work with data processing companies and the animation industry to create 3-D visuals that help make sense of it all. This shows that a lot more collaboration outside the oil and gas world is possible.

In his last years at Shell, Bichsel challenged his project engineers to rethink the way they built production plants. "They were still banging into

steel the same way they had 40 to 50 years ago. Nothing had changed!"

The answer it seems could be 4-D modelling. While 3-D shows how something looks, the fourth dimension adds the element of time or sequencing. A computer can model how and where to put equipment together in a sequence. For example, an engineer could model the heavy lift of a 5,000 tonne module on an offshore platform to remove all the inefficiencies before actually performing the operation in the field. It saves all the trial and error of men in hard hats and gloves directing it in place with a crane. It's much safer too. Engineers can now model how to build a whole facility or production complex in much more detail, reaping more cost savings and efficiencies, whilst boosting safety on site.

Improved efficiency

Elsewhere, computer algorithms tied to valves dubbed "smart chokes" are optimising the well process to make production more efficient. Traditionally a gasfield tends to produce higher volumes at the beginning of its life. But as pressure falls over time and reservoir water enters the bore, it makes it harder to pump gas economically. Quite often a lot of gas is left stranded once the well is shut-in because it's unprofitable. But smart chokes can keep the gas or oil flowing much longer.

"It's a classic case of taking IT together with understanding the reservoir flow and applying the technology across the asset base to extend economic life," Bichsel says.

He's excited about the advances being made in automating drilling technology too. Bichsel believes automating drilling will not only cut drilling time and costs significantly, it has the potential to vastly improve safety.

"Drilling is actually one of the biggest costs in the field, so bringing down these costs will be a breakthrough, but not a headline grabber," he adds.

Bichsel points out that while breakthrough technologies – such as gas-to-liquids or floating liquefied natural gas plants – grab headlines, it's the step-change advances that will slowly revolutionise the oil and gas business. ●

