

Personalised for:
Rachel Parkes

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The digitalisation interview: Murray Callander, chief technology officer, Eigen



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Oil prices may be staging a cautious recovery, but the pressure on upstream oil and gas operators to make their operations more efficient remains. Central to this process is digital technology, and the effective use of big data. Gas Matters speaks with Murray Callander, chief technology officer of digital systems developer Eigen, about the latest digital trends in the gas sector and how they are shaping the industry.

Some reports suggest that digitalisation can reduce capex by 20% on average – does that fit with what you see on the ground?

It's possible - you can increase the recovery rate by managing the reservoir better, and you may be able to reduce what goes on a rig. If you can remove men from the platform, then you can avoid the need to install a lot of equipment - for example, living quarters and life support/safety features. Getting more out of the field reduces per barrel capital expenditure, while remote operation or minimum manning can give up front reductions as high as 50%. There was even one designed for Statoil that cut 80% off the budget, although I don't think it is getting built.

The key is to keep maintenance hours below 5,000 per year, then you can have unmanned platforms and can do the work on a campaign basis. But is this attributable to digitalisation alone? It is in fact a combination of things. You need more monitoring and information coming from equipment as there's no one there to do it. But just digitising everything on a gas rig is not enough, you need a change of mindset.

So it's a change in mindset combined with the digital and other technological advances that's required together to make the difference?

Yes, that's right. As well as digitising, you may need to modify equipment – using stainless steel, for example so you don't have to send people out to paint it. Or increasing the volume in a compressor by 300%, so you only have to change the oil as third as often.

What about choosing the right information?

There's a process the industry has to go through to operate completely digitally. The industry currently has too much data to deal with efficiently, but it has to solve that problem because the volume of data is only going to go up. At the moment, it's in a very reactive state and it needs to become more proactive in order to operate unmanned. It needs to have a much better awareness of what the current status is and how long it has to react to issues.

It's not just the operator that can drive change. If the project goes to an EPC contractor, it may be able to deliver the same project 20% cheaper by adopting digitalisation.

Are there any examples of projects you can tell us about?

Our biggest gas project is Shah Deniz and the related pipeline in the South Caucasus, where we installed all the digital monitoring, commercial reporting and visualisation.

Are each of the wells monitored separately and can you vary the flow from a central control?

Not remotely yet. Shah Deniz II will have an onshore monitoring system. Certainly, the wells all have monitoring on them.

Does that feed back into the reservoir model?

Yes, that's a slow cycle feedback though. The engineers watch the data all day and look for trends over time and that informs their decision how to operate.

So humans watch for patterns at Shah Deniz, not artificial intelligence (AI)?

Yes, Shah Deniz went live in 2008, a long time ago. It wasn't called digitalisation then it was called the Digital Oil Field. There was a lot of talk for years, but little excitement. Now everything is aligning to encourage the introduction of digitalisation – the internet and the computer power for analysis, lots of parallel factors allowing effective delivery, plus the need to get costs down.

Shah Deniz was forward-thinking – even collecting a lot of data then was seen as revolutionary, but artificial intelligence requires much more data.

So is digitalisation now being driven by the potential that AI has?

Yes, that's like the top of the mountain. One day we'll just be able to monitor a couple of

variables and sip margaritas on the beach. But we're not there yet, and we must build to get there.

First, we must make best use of the human brains we do have. So rather than have them just looking for trends in data, we need to be applying their knowledge to solve problems and make things more efficient. Then we look at what we can automate - are there any repeated tasks or learnings that we could teach a computer? Once that happens, the humans can step up the ladder and be more proactive rather than reactive, more forward-looking.

As we become more reliant on the computer to provide quality information and trustworthy analysis, we can start training it to do the more complicated stuff across data sets and predicting into the future. So, you've got computer and human running in parallel for quite a while and then at some point you may decide to let the computer run it.

“ *There was a lot of talk for years, but little excitement. Now everything is aligning to encourage the introduction of digitalisation – the internet and the computer power for analysis, lots of parallel factors allowing effective delivery, plus the need to get costs down* ”

So this could be possible with new projects because they will have sufficient sensors and digital infrastructure in place?

Yes, that's right and that's where it gets exciting. The vision needs to be there early in the project. It's only economic to do it in the set-up phase, not retrofitted.

But isn't much of the work in the North Sea on a retrofit basis?

Yes you can do some, but it's difficult to get enough information to do AI and everything else. Retrofitting is normally just operational digitalisation, rather than strategic – so it can save you money on a day-to-day basis by putting in some monitoring of key equipment, and so on. This is operational gains-based digitalisation, which can quickly pay off in the short term.

With strategic digitalisation, you are looking long term and need to be prepared to design the platform for a new way of operating, so you can capture information that you know you will need for learning, at least initially.

Do you have an example of operational digitalisation?

Yes, that's where we see most of the activity at the moment. Lundin, although they are mostly oil, had a reasonable amount of data but were drowning in it. We targeted it around a single portal, and it paid back within weeks. Now within 30 seconds anyone can get an understanding of what is happening offshore.

Isn't that more about processing than digitalisation?

Yes, it's an information process. You may get the monitors installed and providing more data, but what do you do with it? It goes into a database and into spreadsheets. So, although the meter is producing the latest high level of data, what we're doing with it is still old-fashioned. We want to be able to learn from the data and readily access it, rather than just leave it lying in someone's

mailbox. If we can make the process of handling the information more efficient then we unlock the ability to do smarter things on top of that.

We are also talking about the more strategic stuff with our partners. Edvard Greig went live 2015, with a lot of sensors. But new projects can do even better.

Why was Shah Deniz so early?

It was a front runner, yes. Before the 2014 crash much of the technology was available, but there was little enthusiasm for it. Gas-fields didn't need to be more efficient, operators made money anyway. Things changed when prices fell. It was a painful, but essential to force new ways of working to cut opex. Shah Deniz was a traditional operation with much more monitoring – it has greater potential, but was not digitalised with the latest strategic aims in mind.

So since 2014 the strategic side of things is increasingly being implemented on new fields?

Yes, exactly. And now the big companies have come out to claim their lower opex costs across future projects, which in the case of Statoil is USD 27/barrel.

“ *Things changed when prices fell. It was a painful, but essential to force new ways of working to cut opex.* ”

Yes, many companies are touting much lower numbers on future projects, but how much of that opex cut is down to digitalisation?

Well, there was the immediate saving of slashing rates for everyone involved in the industry down about 30%. Then as you start to change the way you work, digitalisation becomes essential in a more efficient system with fewer people. It is the platform upon which other innovations are built. On operational digitalisation the key must be to take less time between sensing something and acting (or not) on the information.

So it's not just the operation and getting more out of the field, it's also the maintenance?

Yes. What you want to do ideally, is not maintain something. The real benefits come when you have a sensor that tells you that you don't need to do anything. So rather than replacing the equipment, you can be sure you are safe not spending the time and money. In order not do the maintenance work, you need to know you are monitoring everything you need to monitor.

I guess there are not enough monitors in the North Sea at the moment, as there have been many gas outages in the last 12 months?

Yes, that's right. That's the importance of getting the complete information picture, that's step one, and step two is to get to where you can trust it. Digital trust is important. The report is run, now how do I know that's right?

So, eventually we get to an autonomous gasfield? What is the end-goal?

If you draw a parallel with space travel, where we've remotely sent probes to Mars, it should be

possible to do this for oil and gas in remote locations as well. We could have modular gas rigs - take one off the rack and put in some coordinates. It then sails off, penetrates the ground in the right place and drills a hole. Then hook up a pipe to it and it sits there quietly producing gas.

There are going to be some step changes, but that's the way it's heading. The cost of producing gas will go down steadily, with perhaps smaller independent gas companies coming through that specialise in different parts of the operation.

Which are leading companies?

In operational digitalisation in the North Sea, they are companies like Point Resources, Chrysaor and Enquest, all of which are focused on lowest cost production, having bought assets from majors. However, all are operating old assets, so it's a difficult transition, and hard to do strategic work.

Strategically, with new fields, the companies leading the way are perhaps Statoil and Shell. Wintershall is also a front runner with some unmanned gas platforms in Dutch sector. Exxon Mobil [is there] too, and Aker BP also has big plans.

When might we see the first fully unmanned field?

There already is one. Woodside's Angel gas platform in Australia has offshore compression and is unmanned, which was done by KBR. Also, the Pohokura gas complex in New Zealand - although that one is onshore, it is still unmanned.

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