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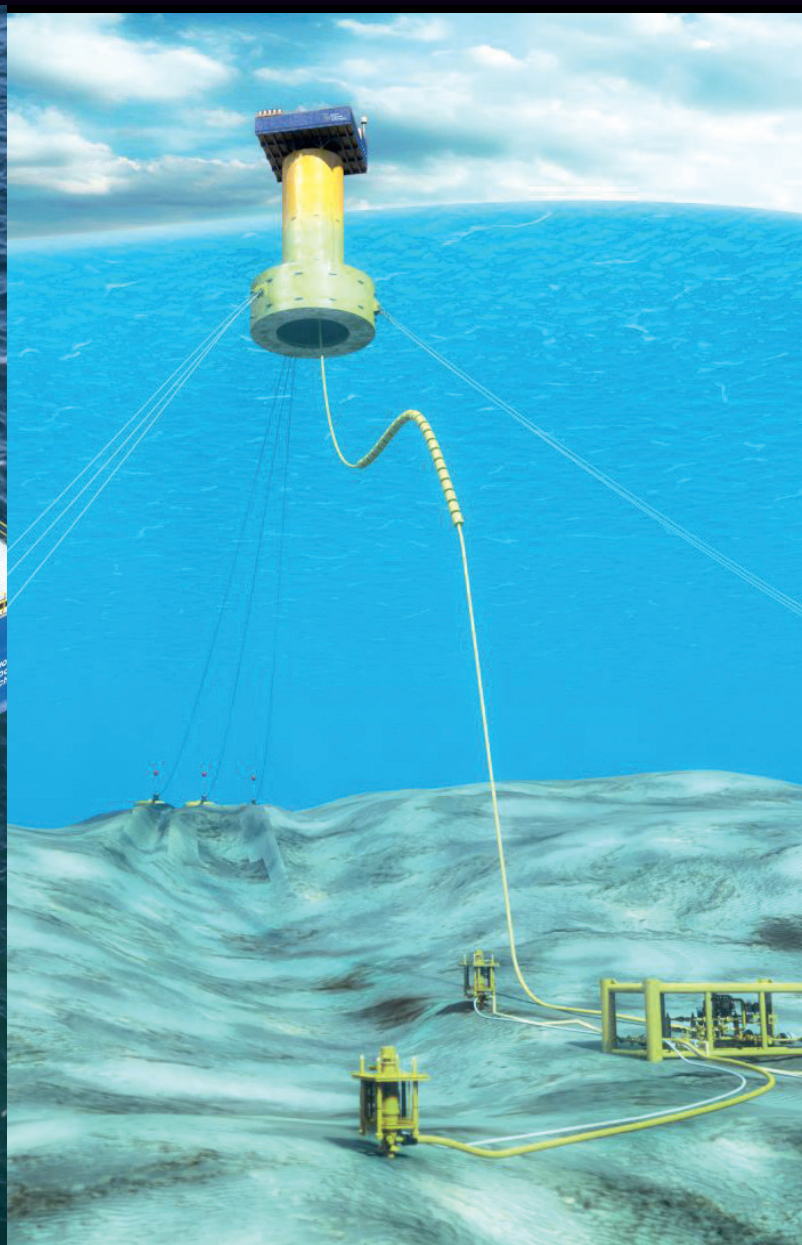
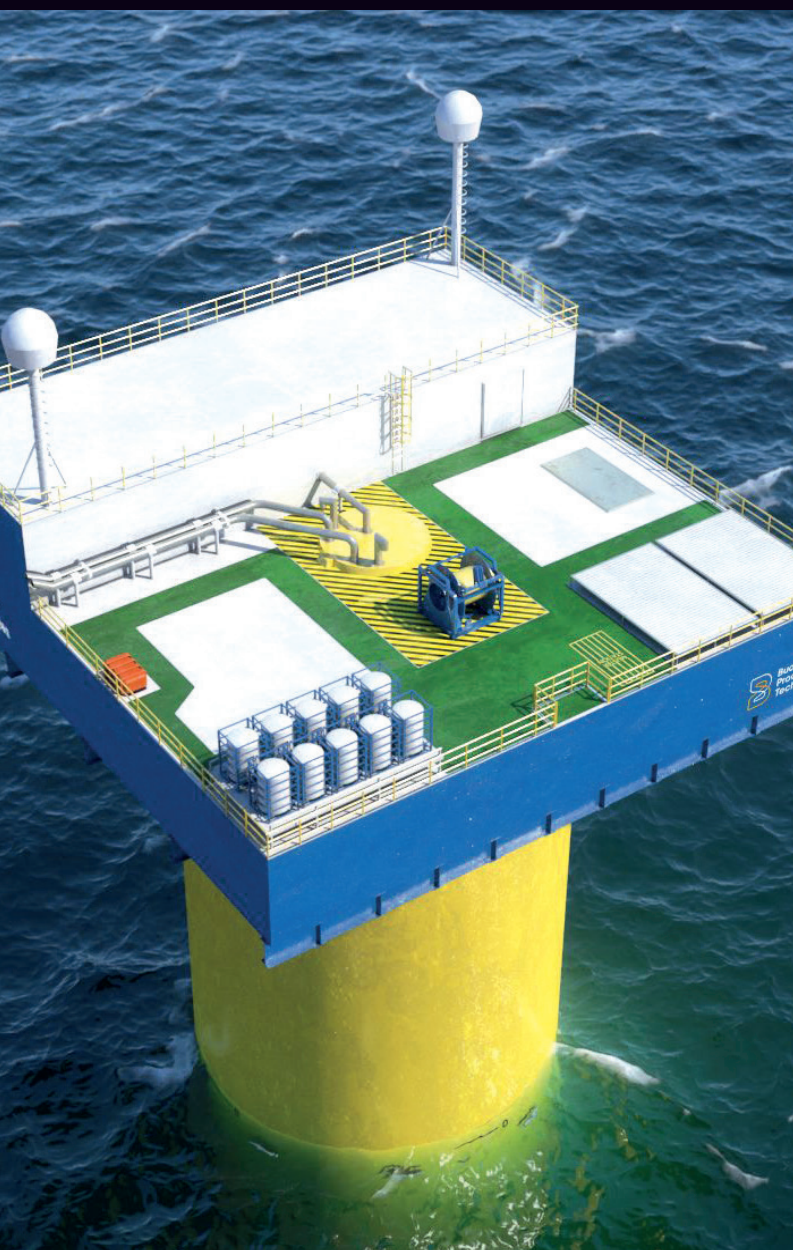
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Well data analytics as a service

April - May 2020



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# Lone Star - well data analytics-as-a-service

Lone Star Analysis of Dallas provides well data analytics as a service – aiming to build fast models of production systems for its clients and provide alerts and insights from them.

Lone Star Analysis of Dallas provides insights to customers about their wells and production systems as a service, so they don't need to do data analysis themselves.

Lone Star employs people from a wide range of disciplines, including petroleum engineers, statisticians and applied mathematicians, bringing different areas of domain expertise to the task of integrating the data and trying to understand what is going on. Chief Technology Officer, Eric Haney, has a PhD in aerospace engineering.

The core of the work is putting available data together to build a model which incorporates basic physics of the well and production equipment. For example, that a certain flowrate would lead to a certain amount of liquid in a tank after a certain time. It builds a specific model for each well.

Production equipment can include piping, generators, compressors, variable frequency drives. It should be seen as a system because a failure on one piece of equipment, such as a wastewater injection pump, can cause interruption to all production.

The model can cover issues related to supply chain and economics as well as engineering.

The company focusses on real world relationships with the data, not trying to write machine learning algorithms. "We're going to teach it a set of business rules. We can come up with a set of baseline rules that apply to all wells," says CTO Eric Haney.

Over time the model can be fine-tuned to

the unique characteristics of any well. "We can adjust some small coefficients," he says. "Perhaps there will be some machine learning involved."

"We know what fluid characteristics do, we know what electrical losses do, we can teach the model as much as we possibly can."

Sometimes 'virtual sensor' data is calculated, where you calculate what a sensor reading would be if you were to have a sensor there, using other data. "We've done some very interesting things where you don't have all the data you would love to have. If you know enough about the system and the physical relationships you can get significant insights."

For example, for one company, it did not have data about how often certain components needed replacing, but it did have data about how much these components were being ordered, which could be a proxy for the same thing.

The approach could be applied to "anything that has uncertainty and imperfect information," he says. That includes condition based maintenance and real time performance optimization, maximizing cash flow, or whatever matters most to operators.

The models can be used to better understand how the well is operating and identify problems.

It can be used to spot problems with equipment, including problems which are emerging. This means that companies can do maintenance in a more proactive way, and schedule maintenance work at a convenient time, rather than fixing problems.

Lone Star also looks for ways to improve the data it receives, including removing noise, filling in gaps and spotting errors.

The company does not get involved in data connectivity – it integrates with tools such as ABB's Well Head Manager to get data stream from the various sensors on the well.

## The best and fastest model

Perhaps the challenge is best described as being able to build "the best model, the fastest possible, do that many times over," Mr Haney says.

"We've got to be able to deploy a model very rapidly and have it running, or it isn't valuable."

"Customers want to see how predictive we can be.

"And they are not willing to wait years while we go through and apply machine learning techniques. They don't have time to wait, especially if you are relying on clean training data to get you up to speed."

The data models can be scaled up quickly from one well to a million, since the software is cloud hosted.

Perhaps it might be possible to "automatically provision" a predictive maintenance model, automatically turning on and off different sections of it.

"If you want your electrical submersible pump monitored, here's the price, we'll take it on ourselves," he says.

"It's not necessarily tenable to manually configure well by well, but we've got some interesting approaches."

"The wells are constantly changing – the equipment, the environment around."

## Working with customers

Lone Star is keen to sign subscription agreements with customers, where the customer provides full access to the data, and Lone Star will only alert them when something specific needs to be changed on an asset.

So the client organisations do not need to have their own staff members watching screens, or any alerts telling them that they are operating within spec.

Customers might have a small number of people managing tens or even hundreds of wells – so they need to focus on where they think the highest priority is.

Lone Star has been in business and profitable for 15 years, "bootstrapped by our customers," he says. But the company still considers itself to be in "growth mode", aiming to "open up doors and go faster".

Signing up clients can involve many "beta tests", where companies test out what the company can offer.

It claims that the return on investment seen by its clients has "always been at least 20:1 and as much as 100:1 when they've applied our intelligence."



Eric Haney, CTO of Lone Star Analysis