

## Digitalising Drilling and Well

by Magnus Tvedt, Founder and CEO of PRO Well Plan

TLDR; 5 min read. It's all about digitalization these days. There is no way around.



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### DIGITALISATION

Digitalisation is a popular word these days in the industry. *Digital* means 1 or 0, true or false - precise and discrete measures. *Digitalisation* means stop doing repetitive work with below par quality, and let computers handle all the heavy lifting. Let's have a look at how to digitalise Drilling and Well.

### EXAMPLE

The code in the picture below shows how you choose a mud weight two points above the pore pressure.

What do you mean? No excel sheets, no meetings and back and forths with the geologist? No - in the name of digitalization - we put code behind our decisions. The above code snippet will always give you the correct mud weight, as long as the data you pass in, is in shape. We'll further discuss data quality later, but first, let's lend our eyes to other industries.

### MODERN INDUSTRY

To be a modern industry today, you must master your data. Think of jet engines, store management, and social media. Data tells us everything today; who buys what, what is the best racket for your wrist strength, where am I, when will it fail, when are the dishes clean, did the kids lock the door, and so on. Data controls complex operations 24/7; across time zones and continents.

Logistics on roads and warehouses take on enormous datasets, and can pinpoint the best driver, pick the shortest route, and alert the farmer when the milk temperature reaches ten celsius in the truck without cooling. Big data analysis suggests new store layouts when the customer purchasing pattern changes. In Drilling and Well, we will go through the roof in performance when we get a good grip on digitalisation. So let's head back to our turf.

### DRILLING AND WELL STATUS QUO

Drilling and well operations relies heavily on the operational team detailing the 24 hours leading up to operations. When something changes (it does all the time), this team makes decisions impacting well cost, performance and safety. We rely on that they take in all relevant information, that they have all the necessary training, and that they don't make mistakes. But they are people, like us, so they can never hold all these feats. In a way, we are letting the floor manager in the Mercedes car manufacturing line decide what car he's making that day. Or let the cashier in the grocery store run the business. We promised to talk more about data.

### DATA QUALITY AND HOW WE WORK

The single most important issue for our industry as we move forward, is lifting the quality in our data. When algorithms map all the data points together, decisions will mirror

```
let g = 0.0981
let min_mud_weight = 0
let pp_sg = 0
let kick_margin = 0.2 // sg
for (pressure_point in pore_curve){
  pp_sg = pressure_point.value/pressure_point.tvd/g/1e3
  if (pp_sg + kick_margin > min_mud_weight){
    min_mud_weight = pp_sg + kick_margin
  }
}
// min_mud_weight is now 2 points above the pore pressure at any point
```

the quality of the data. With data we mean pore pressures, procurement strategies, operational procedures, real-time data, and everything that can affect the operations. Our data stretches from overly engineered early phase planning, via the

world's most busy (and unpredictable) coastal logistics, to the underperforming real-time reporting of our operations (daily summaries). Today it's acceptable to override a simulation or engineered plan by a gut feeling or hunch, and experiences are often stored in a document. Even if the paper is digital, that's still a manual work process. It seems like we also have to look at how we work.

A way to measure the quality of a workflow is to place a timer in the meeting room (Internet of Spying Things, a booming market). Now, invert that number, and see how much time there is left for quiet, quality thinking and deep problem solving. If you get a sense that the majority of time is spent meeting with colleagues, it means tasks should be digitalised. When meeting rooms become the place to shine in your organisation, there is no incentive for employees to work rigorously, over time, on breaking down complex issues - the weekly meeting behaviour is more important. So we will push more of the repeated work and communication over to software. No doubt we'll get more rewarding digitalized workdays, but what about safety?

### RISK MANAGEMENT

The code snippet on this page is what a digital risk analysis looks like. Again, when the data changes, the risk matrix is updated.

```
let narrow_margin = 0.1 //sg
let risk_register = density_plot.map(point=>{
  if ((point.frac - point.pore) < narrow_margin){
    return ['narrow_margin', point.depth]
  }
})
// risk_register will now hold lines like
// ['narrow_margin', 2435] where the
// drilling margin is less than 0.1
```

Whoom, like that. Maybe you think: You can't catch it all with algorithms? Well, If you can put a logical explanation to what we are looking for, it will be shining on the risk list, in red, green or yellow. Then you can spend your time on new solutions to remedy the risk picture.

### CUT THE COSTS

We'll be drilling wells at half price and double precision - that's our ambition. By connecting more and more dots - equipment, fluids, geology, pressures, drilling practices, sensors, and data analysis. Churning operational experience, modern software and hardware capabilities gives us the best performance tool, with consistent, optimal performance. We can cut expensive contingencies in well design and equipment, and measure real performance. Outputs from the digital well plan are auto generated reports, schematics and detailed operational procedures. Or machine control input if you really want a stretch for modern industry (bring in the robots).

### PROSPEROUS PATH

For the longest we have been protected by the complexity and high threshold of entering the business. When smart algorithms opens for other industries to interact with us, we will see a new dawn of advanced operations. There are no other industry where workflows

are made for people, both in academic and in physical tasks.

We embrace the tomorrow, as we will get more wells, more projects, and more business in the years to come. Soon we will be fighting for who owns the data, and who has the smartest algorithms.

*"We call this the #fightagainstcopypaste, and it's a battle worth every second of our time."*

#### About the author:

Magnus is the founder and CEO of Pro Well Plan AS. He is an enthusiastic entrepreneur, speaker and coder with ten years of experience with international well planning.