# OPERATIONAL EXCELLENCE
## IN ENERGY, CHEMICALS & RESOURCES

# DRIVING DIGITAL TRANSFORMATION: THE FUTURE OF AUTONOMOUS CONTROL ROOM OPERATIONS

## An interview with Vicki Knott, P.Eng
### CEO and Co-Founder, Crux OCM

## Can you tell us about your background up to and including your current role as the founder of Crux OCM?

I'm a chemical engineer. I began my career in the pulp and paper industry as an engineer. After I graduated from university I moved into the oil and gas industry, and began working with one of the biggest pipeline companies in North America.

I spent a lot of time in their control room and then a lot of time in the field commissioning control systems. About that time, I met my co-founder, Roger Shirt. He has a PhD in process control, and had been consulting for multiple major pipeline companies for many years. Having spent a lot of time in the control room, I really started questioning why it was still necessary in modern operations for control room operators to use procedures, checklists and rules of thumb. Major assets and control rooms were being operated in very traditional ways with little innovation since centralizing control rooms, and so we began to brainstorm how we could really streamline these processes to make control room operators day to day jobs more manageable.

A big concern in the industry is the way in which long periods of inactivity combined with short bursts of a lot of activity and shift work contribute to control room operator fatigue, which in turn is significantly correlated to safety incidents. So we made this one of our main points of focus, alongside improving efficiency and production. Roger and I equated control room operators and their daily processes with airplane pilots. Pilots in planes have autopilot, and whilst people would be unwillingly to get in a plane without a pilot, the majority of people would also be uncomfortable flying without autopilot software.

Using this context, our aim was to start providing control room operators with that capability. When we started investigating this it became evident that not only were there big safety positives to control room operators but also positives in terms of the ROI. Being engineers, it was interesting for us transitioning then into the more business side of things.

## Given these exceptionally challenging market conditions, oil and gas leaders are razor focused on finding inefficiencies in their operations to drive out cost and risk. How do you think automating control room operations can help?

We've been working closely with both former c-suite executives from oil and gas and former c-suite executives from software providers to oil and gas. Speaking with both groups, alongside our customers, it's evident that there is a heightened focus on efficiency industry wide. In midstream gathering, transmission and processing, the depressed oil price makes it very difficult to increase tariffs or tolls to customers.

In light of this, efficient operations become even more vital in addition the increased safety. Additionally, automation also reduces human factors incidents, thus again increasing asset utilization.

Another concern that has become more prominent in the context of the Covid-19 pandemic is the aging population of many frontline workers. It's important to harness the experience of our workers in order to be able to pass it on to the younger generation in order to continue operating these assets as efficiently as possible.

More directly, the Covid 19 epidemic has forced companies to encourage working from home. With field workers and control rooms, business continuity would be impossible if employees were to work from home. Therefore, going forward the industry will need to increase automation to the degree that control room operators and frontline workers can also stay safe while maintaining the essential business continuity for organisations and the economy. In the long term, this may mean enhancing security and automation to a point where control room operators can work from laptops like the rest of their workforce.

## Where can automation have the biggest impact in an oil and gas company?

The industry is moving rapidly toward robotic process automation. I hear repeatedly from oil and gas companies that they're seeing tremendous value in their contracts from this type of automation, and helping to automate daily, repetitive tasks that previously occupied employees.

Additional significant value can be gained by using this concept in other human processes. So for us, thinking around how a human interacts with the physical assets, and then from there looking into how you can automate these procedures, checklists and their rules of thumb. The RPA concept may be incorporated in how they perform maintenance and work in the field. Alternatively, the focus may be internal control rooms, which is where we are, and

how they start up these assets or maintain rate changes on these assets. This automation of human processes has helped optimise other industries, and it's now really hitting the tip of the iceberg in oil and gas. This is such a large and typically profitable industry, so there's a lot of opportunity to refine and improve processes through digital transformation and enhanced automation.

We call what we do robotic industrial process automation, and it typically works best in workflows that impact physical assets, like operation of a pipeline or a gas plant, offshore platform, refinery etc.

In terms of the industry as a whole, when it comes to finding efficiencies and keeping your margins, especially in a time like this, there's not just one solution. It's going to be a combination of all sorts of these small, little, incremental things that will have the biggest impact. If you keep working on operational excellence, you really start getting these wins. It's not going to happen overnight and it's not going to be one solution or one provider that's going to achieve that for the industry.

## Can you give some insight into the nature of your work?

We work with the control room operators and their procedures, taking the historical data, and building physics-based, machine-learning models on these systems. We then incorporate that into control schemes that fully automate how they execute start-ups, shutdowns, and flow rate changes on their system.
Essentially, we're automating the high-workload activities so that companies and control room operators can refocus on safety, efficiencies and the scheduler that's calling them and asking them to make a customer requested change – like change a delivery location.

Our automation allows for a supervisory approach, pushing one button to make that swing or make that start-up as opposed to pushing hundreds or thousands of buttons. In this way, operations are made to be as efficient as possible.
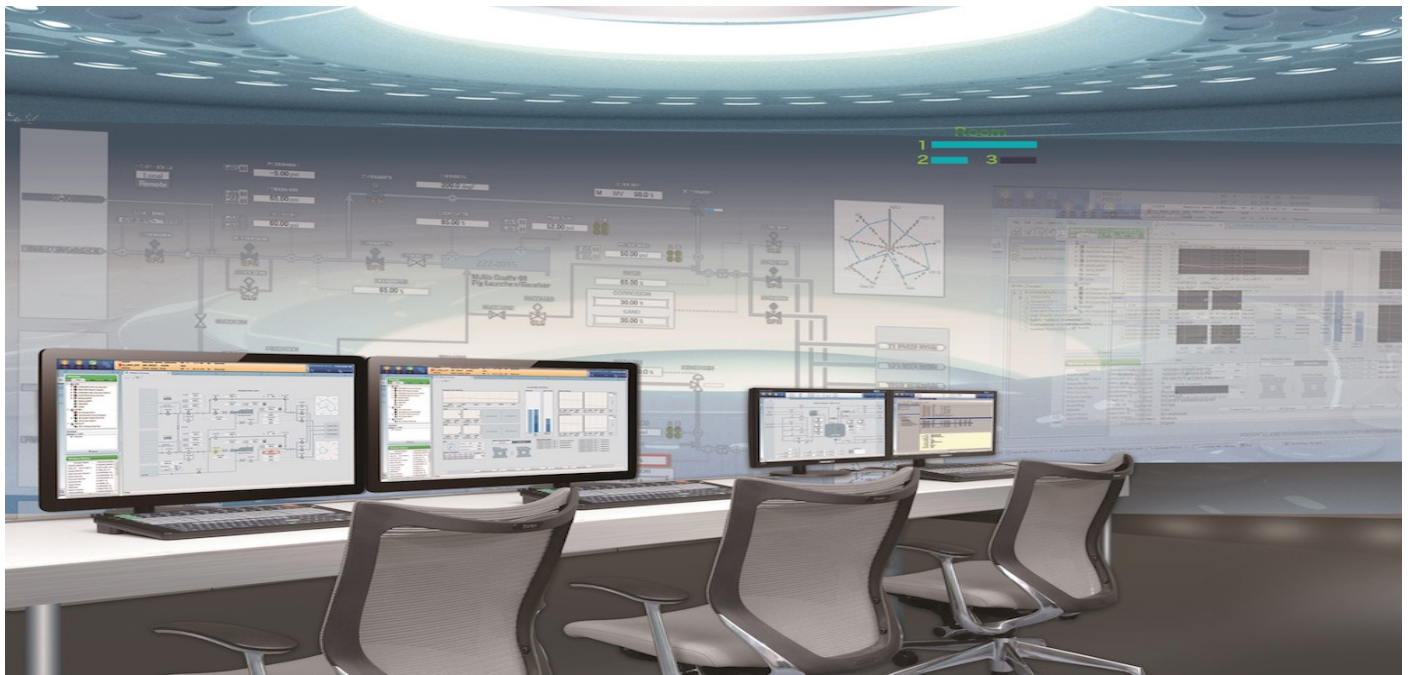
For us, we place value upon providing frontline workers with the best tools, otherwise there is a trickledown effect which impacts the bottom line of these organisations.

## How does control room automation allow you to improve safety?

Operational excellence practices are key to our As we've seen in other industries, as you remove human factors, you significantly increase safety. With our initiatives, we've proven that we can reduce control room operator interactions on systems by 99% plus. Statistically, a large magnitude of safety incidents, specifically on pipelines, are related to fatigue. By automating the more repetitive control room tasks, you can greatly reduce fatigue and have employees high-ly engaged in much more important, high-impact activities.

## What is the bottom line benefit to companies?

Every time that you are able to start these assets up faster and operate them at maximum rate, whether that be LNG, oil pipelines, refineries or gas plants – any major asset with a central control room, you are increasing the volume that you throughput on these assets. In Canada, a number that we have achieved through our simulations on Canadian major oil pipelines, we've established that we're able improve the speed of trunk line start up by 40%.

If you start up a major oil pipeline 40% faster every time, that equates to almost 4% in additional volume that you throughput. This 4% additional volume throughput on every single major oil pipeline leaving Canada equates to 168,000 barrels per day. At $50 per barrel, that is significant.

Additionally, assets such as an LNG plants, pipeline gathering systems, refineries, and offshore platforms will benefit from a faster and more efficient start-up as it translates to reduced wear and tear on the equipment, less flaring and less environmental impact alongside this increased production. So there's significant opportunity, as we've already seen with RPA, to continue automating how people interact with these systems via RIPA.