

# Human Factors meets Data and Analytics at Chevron

*We spoke with Graciela Perez, Global Manager at Chevron, who shared how the global oil and gas giant is leveraging human factors and data analytics as part of their Lean Transformation.*



I am a Global Manager with Chevron and have 25 years of experience in manufacturing across chemical, pharma and oil and gas, including ten years of public service as a national compliance coordinator for Federal OSHA has afforded me immersion into over 600 manufacturing environments in 49 countries. I've formally studied industrial and systems engineering, human factors engineering, organizational psychology, physiology, epidemiology and biostatistics and am certified as a Lean Six Sigma Master Black Belt and Human Factors professional. This multifaceted background enables me to bring a multidisciplinary approach to operational excellence. A passion for helping people be their best is the basis for my high energy approach to inclusion and continuous improvement.



## **Can you tell us what you're working on currently there at Chevron?**

I've been fortunate to experience diverse roles across Chevron, from ergonomics, to human performance, Lean Six Sigma, supply chain, engineering, energy technology, across our upstream and downstream businesses.

That's pretty common in our industry, where experienced hires may move between positions every eighteen months to three years and even faster in early career, development programs.

In my current role as Global Manager, I focus on four areas: people development, cost reduction, reliability and operational excellence, with Lean Six Sigma as an enabler.

## **Can you tell us how Human Factors became a point of focus for you?**

I started off as an industrial engineer in manufacturing with a focus in organizational psychology.

As an engineer, there can be a lack of understanding around how humans actually work so I went on to earn a Master's degree in Kinesiology, to understand the human body at work. Historically there's been a recognition of the importance of designing work environment so people can succeed.

In the medical industry, it's prominent because people are trying to avoid mistakes that result in fatalities and costly lawsuits. In the aviation industry optimizing the design of cockpits to reduce pilot error is also about saving lives and capital. In Oil and Gas, we are focused on ensuring everyone comes home safe every day and hu-

man factors applies well to our industry, especially process safety. Optimizing how humans interface with their work and work environment focuses on making sure that we do things well and when we don't, the consequences are minimized; I've learned to do my work with human factors based on how much it is needed to support operational excellence.

## **How do you tie operational excellence, continuous improvement and human factors together at Chevron?**

It's seamless actually, it amazes me that it doesn't happen more often in our industry. For example, there is a concept in Lean Six Sigma, called: Poka Yoke. It's a Japanese term for error proofing. It's interesting because the concept of designing environments that promote the right responses at the right times is part of Lean Six Sigma. People are complex and unpredictable and we can engage them to understand how they work best.

The science of Human Factors helps us understand how people think and linking them together with Lean Six Sigma has helped us learn more efficiently. Lean Six Sigma gives us tool to facilitate the change management around human work interface. In operational excellence a lot of our safety systems are built around who did it and why did they do it, rather than how can we learn from it and make it better. Fortunately, within the human factors and Lean Six Sigma space there's are relatively simple tools to support learning and optimal design.

It's mainly about improving processes with people who do the work rather than throwing capital solutions and just spending money to fix things.





Adding these extra tools helps teams learn faster and constantly improve what they do.

**Where are the opportunities that you think that folks are overlooking in some of those specific tools that you mentioned?**

There are two perspectives important in the use of these tools.

The top down perspective leverages tools such as Value Stream Mapping. At Chevron we often call it “learning to see”. We take a bird’s eye view of a value chain from the end customer all the way to the beginning of the value chain. Within the value chain each function sees how they are an internal customer of the other functions and this connectedness supports cross functional learning and optimization.

Integrating human factors into that view has been so important. Instead of just looking at common indices such as cycle time, cost, inventory and quality, we have additional dimensions such as workload, complexity, error traps, HSE risk levels, latent conditions, compliance assurance and context that we can bring in from the human factors toolbox.

Often in this Value Stream Mapping exercise, we find people are speaking to each other about their work for the first time. The folks in stock control may never have met with a buyer to understand what information is critical for their work. Or the laboratory might have never spoken with Operations about how to help them process samples better. The bottom up perspective is really about engagement where the work is done.

There is a tool within Lean Six Sigma, called “Gemba,”

this is a Japanese term for “doing detective work.” Gemba walks involve leaders going out to the shop floor and engaging workers and - most importantly - listening to them. If you see detectives they ask open questions, listen to all the facts and don’t jump to conclusions. Typically,

Gemba walks focus on discovering process waste such as waiting, excess processing, poor design from the eyes of the worker, not using people’s talents. With human factors, you can take that a step further and add a question: where do you have complexity in your work environment? Where is it difficult for you to provide the right response to your work every time? This is of course done in the language of the workers. Then we add the question: where’s the next accident going to occur? This is not a random process, it’s a management system for engaging the “sharp end” of our workforce. This has been illuminating for leaders, even when they think they know every corner and job in their scope of influence.

**How are you merging this approach to continuous improvement, data analytics, and human factors together?**

Even though human factors has been formally studied since 1949, one of the reasons it may not have taken a stronger hold is that it tends to be viewed as that fluffy “science”. I think the term human factors has suffered from an identity crisis. So unless you’re in a critical field, such as aerospace and aviation, it’s the add-on vs the integral foundational enabler for work. That has changed in the past decade with Europe publishing directives that mandate integration of human factors into the design of work and industry groups have educated their con-



stituents. What data analytics allows us to do, is to get a baseline to show the difference between how our work is today and how much better it can be tomorrow using business terminology.

Without that it's not easy for businesses to grasp the value. With data analytics we can improve how we illustrate information so workers can visualize where they are in relation to targets and respond appropriately. For example, if we provide monthly data to our workforce how does that allow them to change what they do daily? If we illustrate the impact of waiting, we can work to reduce that in the moment in a connected manner with the teams involved. Data analytics has helped us understand how one function causes excessive wait times for another function in real time and helps us balance workloads. The right feedback at the right time drives the right response, whether it be alarms, production data, work instructions, downtime, caution or guidance.

**As you think about these approaches are there any areas that are challenging?**

Any time anything new is introduced, inevitably, there's going to be someone who wants to use that new, shiny penny, as a platform for their career or to suddenly make them the star of the show. This is a team sport.

***"I think the term human factors has suffered from an identity crisis"***

Human factors involves the people who actually know what they're doing, not the theoretical work instructions. I've actually been out in work environments, where a manager would say: "oh, don't worry, you don't need to talk to X. Don't disturb them, they're doing work. Here, I'll show you all the work instructions and you can see what they do." I can't tell you how important inclusion and diversity is when you're introducing these concepts. I think if we look around, most of what we introduce has already been done.

When you're actually deploying Lean Sigma, often you'll hear: we already improved things; we improve things all the time. But, they don't share that improvement. They may always call on the same people to help them in a time of need. So they're missing that opportunity for innovative thinking from someone who might have a different perspective, and might actually teach them a better way of doing something.

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