Digital Transformation in Oil & Gas
In today’s environment, the oil and gas industry needs efficiency and flexibility. Today, only 3-5% of oil and gas equipment is connected and less than 1% of data is utilized to make decisions, leaving companies with significant potential to optimize assets and operations. As the industrial world becomes more connected, the ever-increasing amount of information presents an opportunity to improve safety, reliability, asset health, operational efficiency, and profitability.

Reducing unplanned downtime is one key opportunity area for oil and gas through digitization.

According to a recent Kimberlite study* of offshore production operations, just 1% of unplanned downtime—or 3.65 downtime days per year—can cost organizations $5.037 million each year. Averaging just over 27 days of downtime each year, offshore oil and gas organizations experience $38 million in financial impacts from unplanned downtime.

So where do you start? What steps do we take as an industry to adopt digital solutions and drive step-change in productivity and availability?

Getting Started
Data Driving What’s Next

1) Sponsor from the top. Define and spread your enterprise-level digital vision & appoint a leader with strong governance to execute.

2) Begin with the cloud at the core.

3) Integrate. Interoperability and eliminating process and operational silos is key.

4) Leverage data science and machine learning to do the heavy lifting.

5) Build a roadmap with milestones and staged targets for value delivery. Start small, then scale fast.

*Study conducted by Kimberlite, an international oil and gas market research and analytics company, in Summer 2016.

“Whether you start with [a digital] vision or end with it, the ability to bring insights and change the way you work will transform your organization.”

Andrew Smart
Industry Managing Director for Energy
Accenture

The Journey to Value
For the first time in our industry, GE is developing solutions to unite equipment, production, reservoir, drilling, logging, and well completion data, with the scalability of Predix at the core.

Predix enables the data from assets across our industry to be securely connected, aggregated, and governed, seamlessly from the edge to the cloud. We are leveraging unique competitive advantages to develop an intelligent applications portfolio unlike any other. This combination of industry data, advanced analytics and machine learning are critical to overcoming data deluge and unlocking value for your business.

**Intelligent Applications Portfolio**

Software and analytics + Fullstream industry domain + Fullstream service excellence = Differentiated Productivity Leadership
Digital Twin

It all begins with the twin. A digital twin is a digital representation of a physical asset in which you pair physical and digital data from an asset, combined with advanced analytics and learning systems, to drive a business outcome.

In the consumer internet, knowing people is how companies like Google and Amazon built their businesses. In the Industrial Internet, knowing the machines, systems, factories, and processes will be the keys to future infrastructure growth. The twin is always seeing, thinking and doing, giving us the ability to fully understand and explain parts, products, systems and processes. The twin continuously learns and improves with new data to optimize business outcomes.

Across all of our GE businesses, we have deployed 661,000 twins, generating over $300M. When you think about business value from the digital twin, it’s about learning faster, getting smarter, accurately predicting and reducing risk and identifying opportunities to improve productivity. It’s different for every operation, and every company. By collectively building and deploying all twins on Predix, we are enabling a learning and behavior-based ecosystem for similar asset classes across industry.

From Machine Learning to Learning Systems
Learning + Edge Controls: Oil Field Production Optimization

- **Learn from Self**
  - Equipment failure early warning
    - 30-60 day lead time

- **Learn from Simulation**
  - Reservoir optimizer
    - 10-15% NPV increase

- **Learn from Fleet**
  - Lift optimizer
    - 10-20% Production increase

- **Learn from Humans**
  - Semi Automated Tag Mapping
    - 50-70% Reduction in data ingestion time

Digital Twin – Delivering Business Value in PREDIX

- Parts Twins
- Product Twins
- Process Twins
- System Twins

“The digitalization of the oil and gas industry is crucial to success— the digital twin is how we drive that change to digital, and optimize profit.”

Colin Parris
Vice President, Software Research
GE Global Research Center
Machine Learning

Machine learning— the ability to teach computers to mimic human decision making on data-driven workflows, is a cornerstone of the scalability of digitalization in industry. By building “smart machines” that can infer a complex and continuously improving set of business rules based on past behavior and outcomes, GE is building a robust, scalable, and fault tolerant way to improve operations.

Powering the Predictive Future

The key to successful production-grade machine learning is to approach it from a system engineering perspective. And this is exactly what we are doing at GE. In an industrial context, that system must incorporate a deep fundamental understanding of the physical behavior of the assets being managed as well as knowledge of the context in which those assets are being used.

While there are other companies that have mastered machine learning in a consumer context, in the industrial space, there is no company in the world that can match our understanding of industrial assets, the depth of our related domain expertise, and the breadth of our customer relationships.

Importantly, because industrial systems are the heart of our business, we understand that the requirements for machine learning in an industrial context are much different than in the consumer world. In turn, we recognize that these systems must not only be accurate, but also transparent (i.e. interpretable) and fault tolerant (i.e. recognize that not every decision has the same cost to being wrong).

We have dedicated substantial R&D funding to developing machine learning technology that addresses both of these challenges, putting the control in your hands, and creating a seamless transition between automation and augmentation of human decision making.

We believe that the goal of machine should not be to replace people, but rather to free them from repetitive and mundane work in order to empower them to do what people can do uniquely well: to be creative in innovating and solving the hardest problems you face.

Business Benefits of Wise Technology