



DIGITALIZATION IN OIL & GAS INDUSTRY: DATA GENERATION TO ULTIMATE VALUE REALIZATION

15-16 November 2018, Visegrád

Sameer Siddiqui - Weatherford

TOC

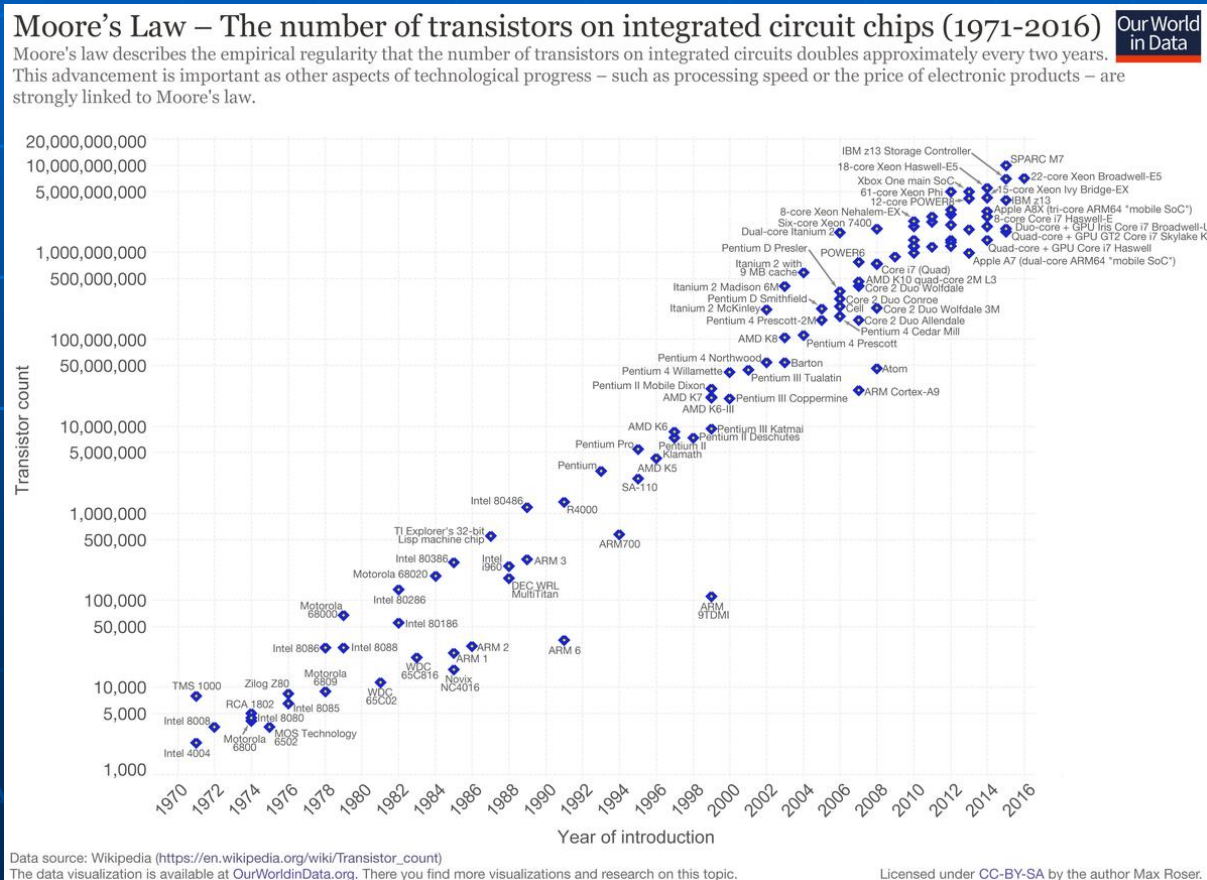
- Digital Technology (Complexity, Digitalization, Network Effects)
- Industry 4.0 (IoT, Automation, Data Analytics & Cloud)
- Production 4.0
- Digital Oilfield and Examples
- Real time Flow Metering
- Production Management Solutions

Distinctive Characteristics (Brynjolfsson & McAfee, 2011)

DIGITAL TECHNOLOGY

COMPLEXITY

- Moore's Law – originally refers to the doubling of the number of circuits on computer chips every 18-24 months



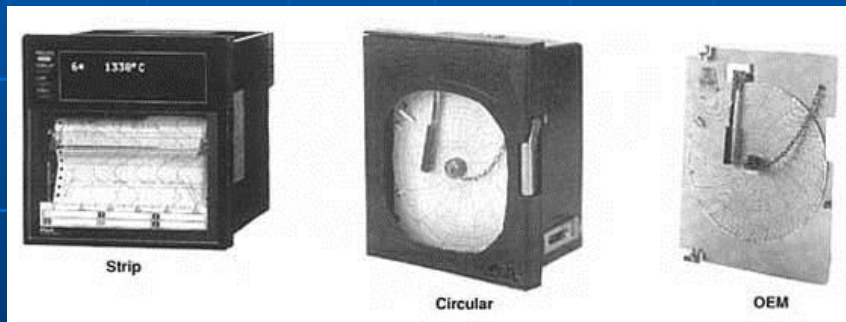
DIGITALIZATION

- Taking content or processes that used to be primarily (or entirely) physical or analogue and transforming them to be primarily (or entirely) digital.
 - Data Devices
 - Data Science
 - Economics of Long Tail (Anderson, 2004)



CHART (P/T) RECORDER

Earlier versions

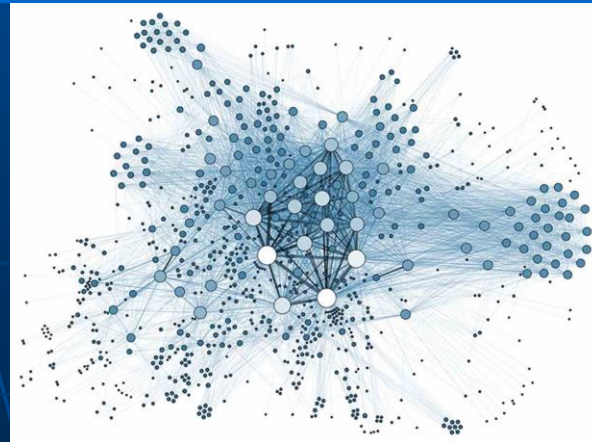


Digital version

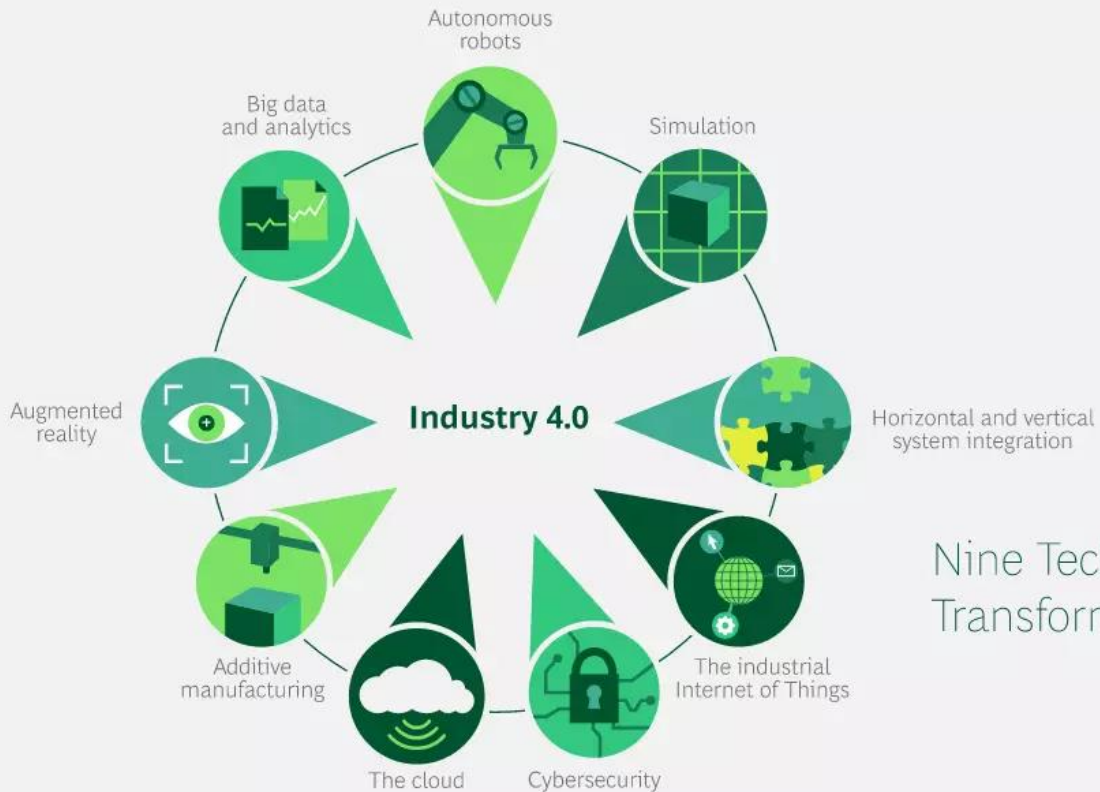


NETWORK EFFECTS

- The benefit of technology use increase with the size of the community of other users.
- Eg. A telephone is of no use when there is no one to call, but as the number of telephone users increases, the value to you increases even though you have not paid any more for the phone



Industry 4.0

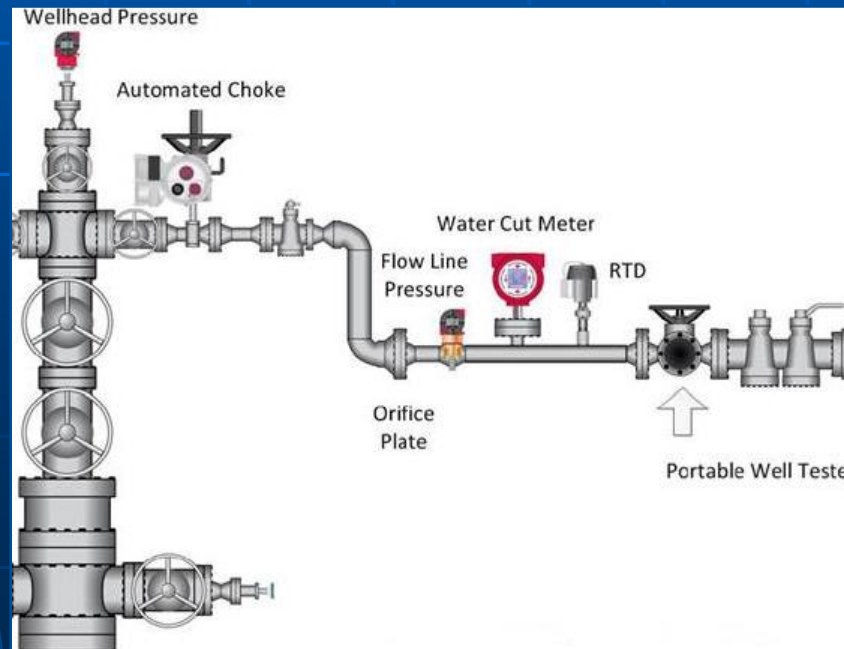


Nine Technologies Are Transforming Industrial Production

Source: BCG analysis.

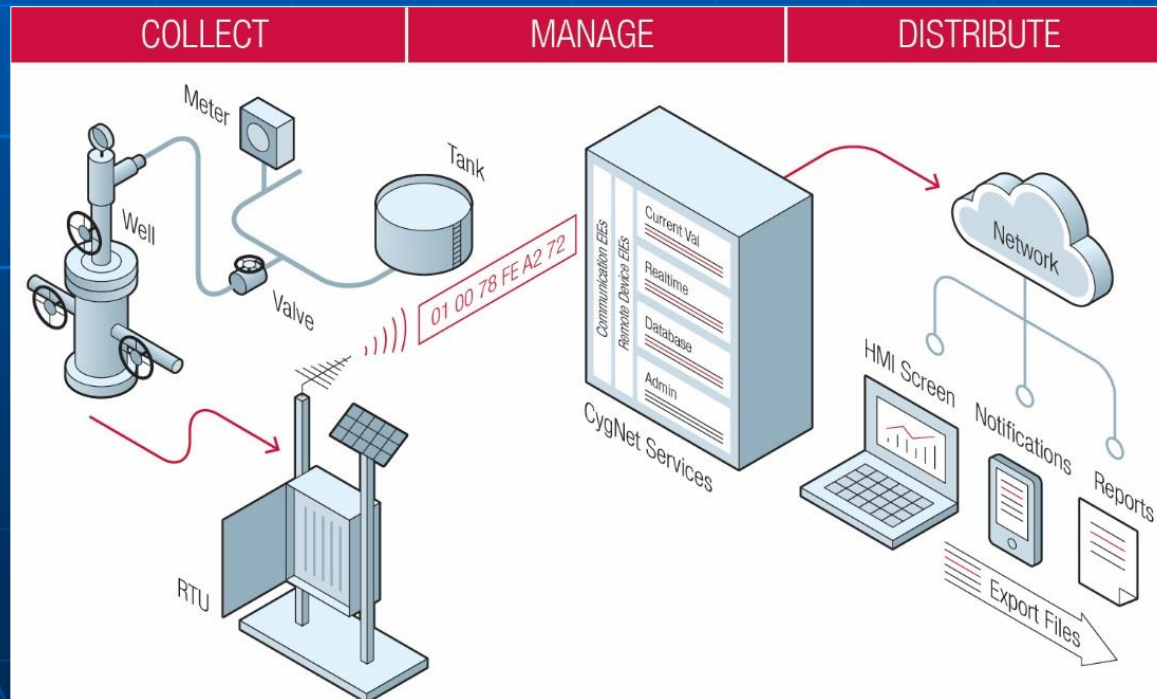
Internet of Things (IoT) Instrumentation

- Sensors and instruments in overall operations generate data
 - O&G mainly has time-series and structured data
 - Unstructured data: acoustics, image, text etc.
- Big Leap: how to extract information/insights automatically



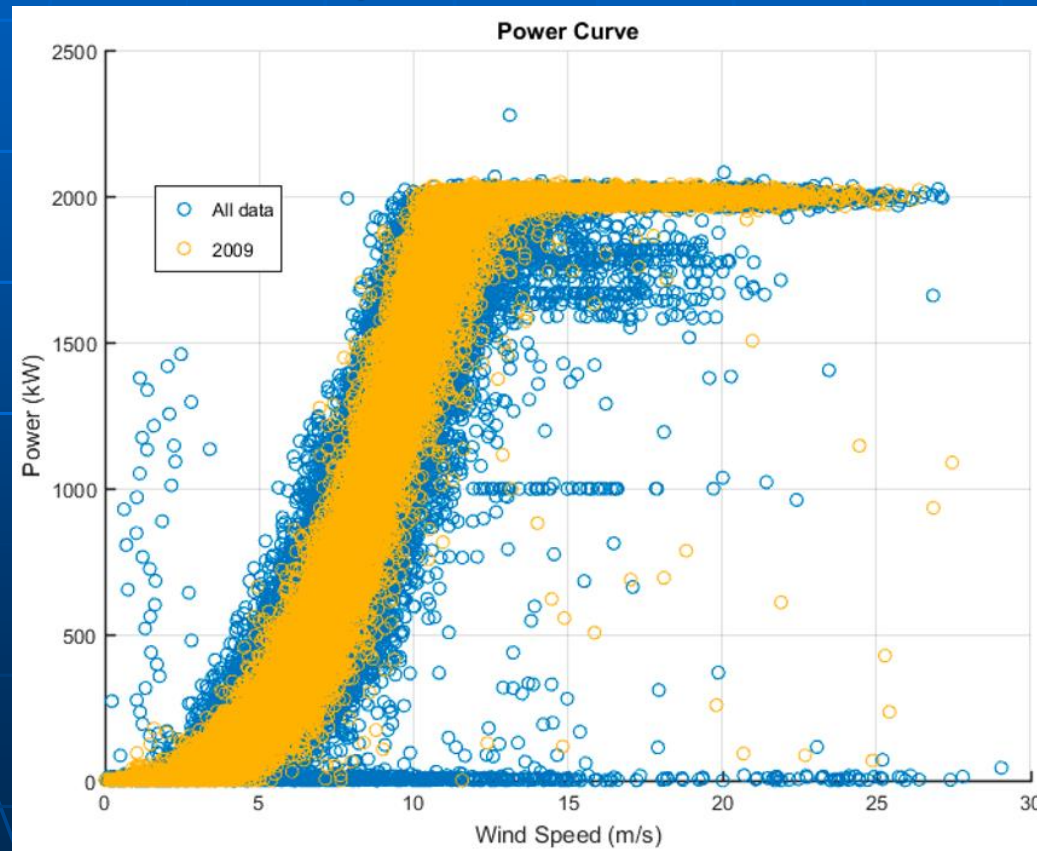
AUTOMATION

- Data
- Communication
- Optimization
- Control

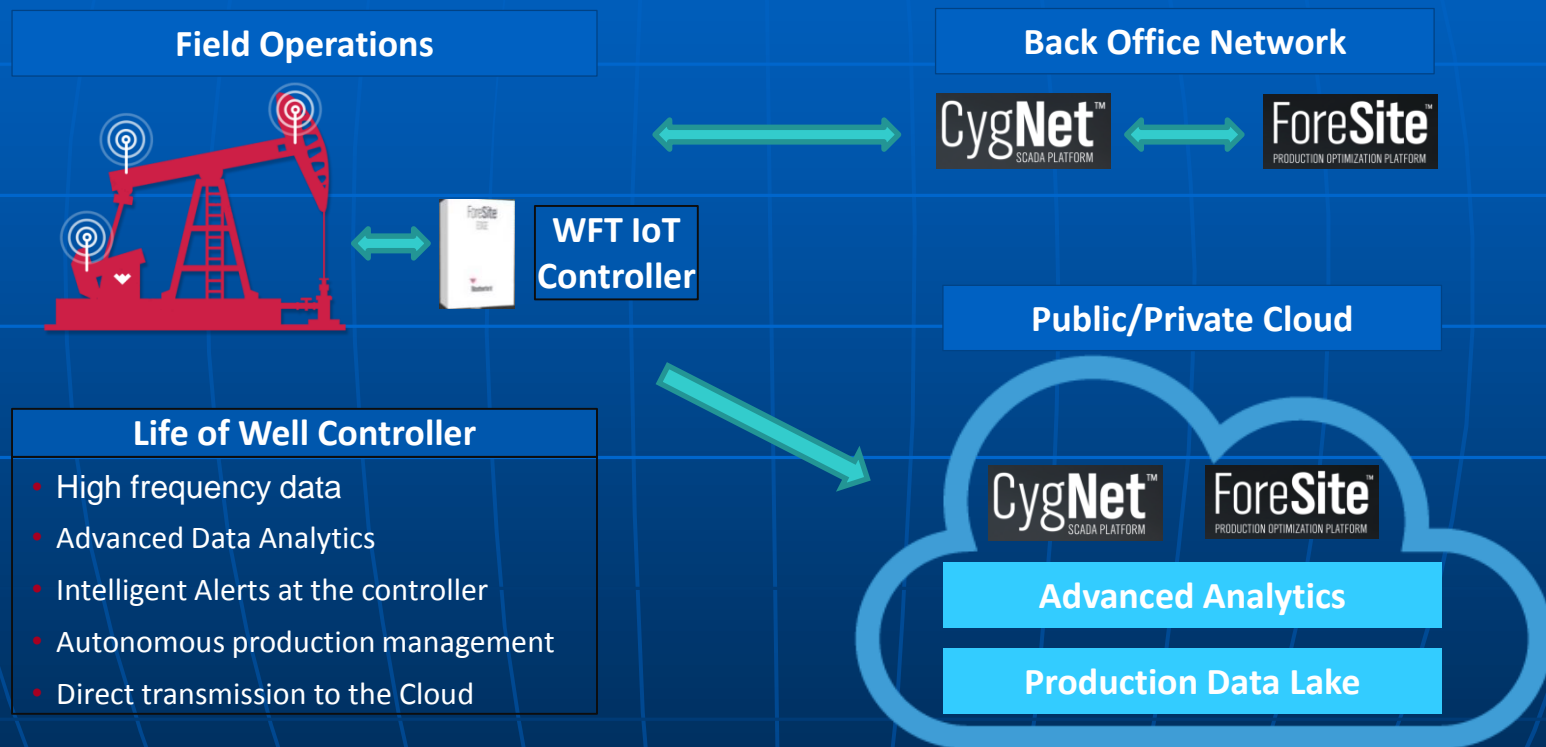


DATA ANALYTICS

- Machine Learning - Dictionary of dataset behavior/pattern
- Time Series Data – sample



CLOUD & CYBERSECURITY



PRODUCTION 4.0

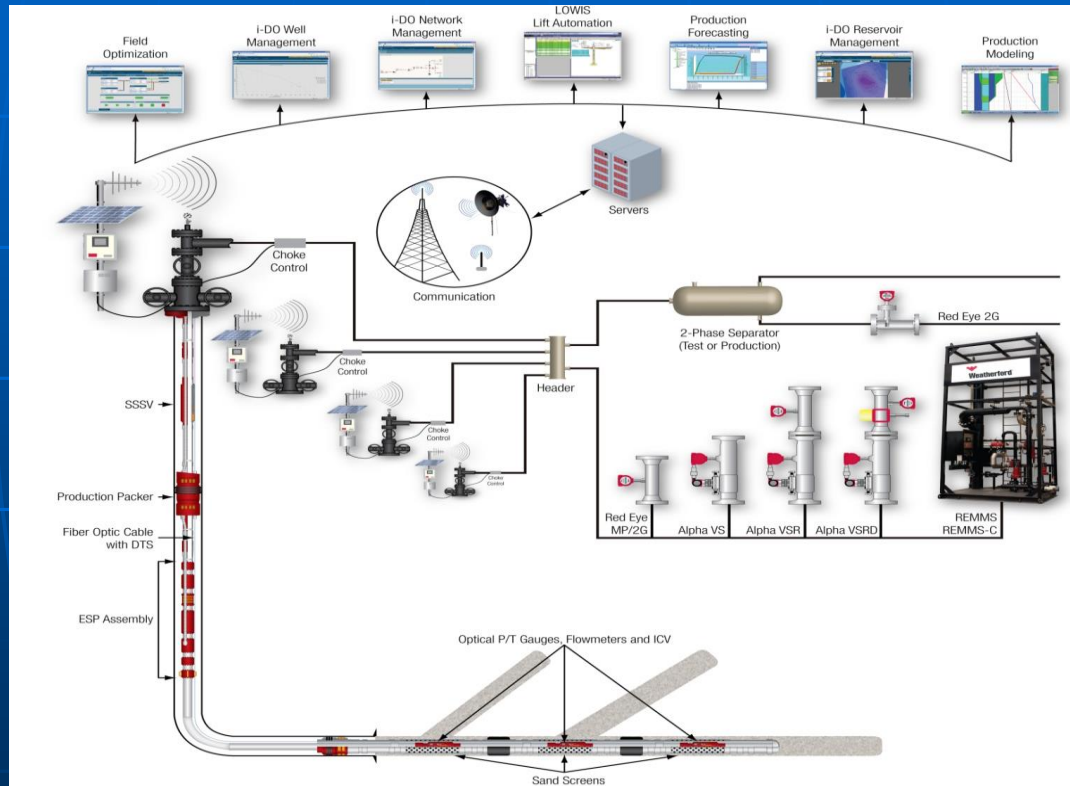


Digital Oilfield - Includes Flow Technology

Analyze & Optimize

Data & Control

Hardware



Optimization

SCADA

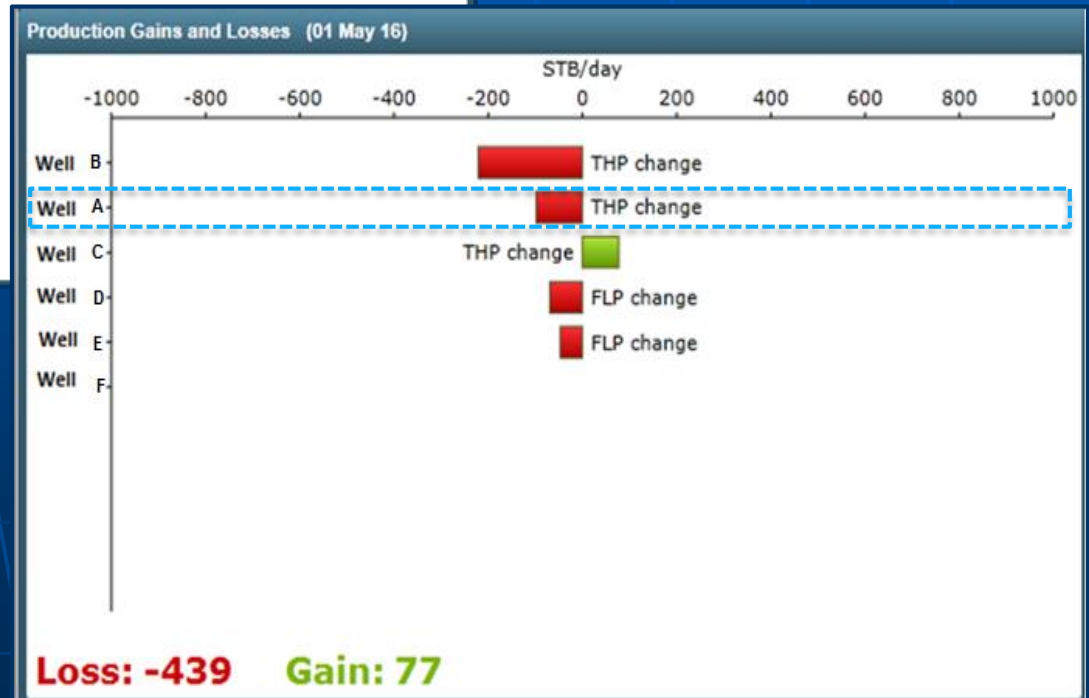
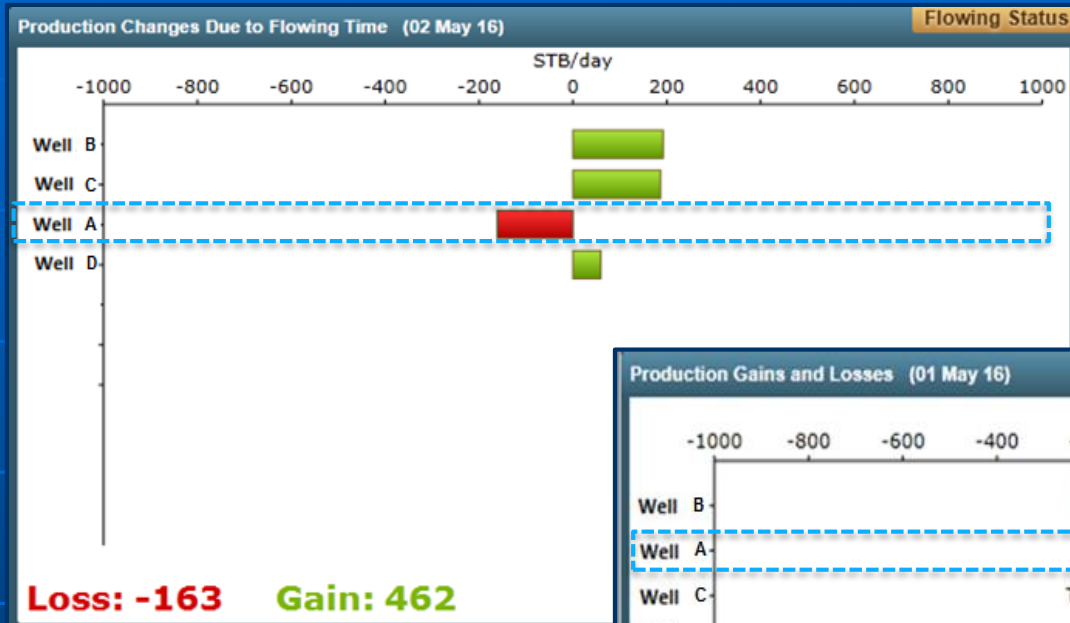
Field Services Management



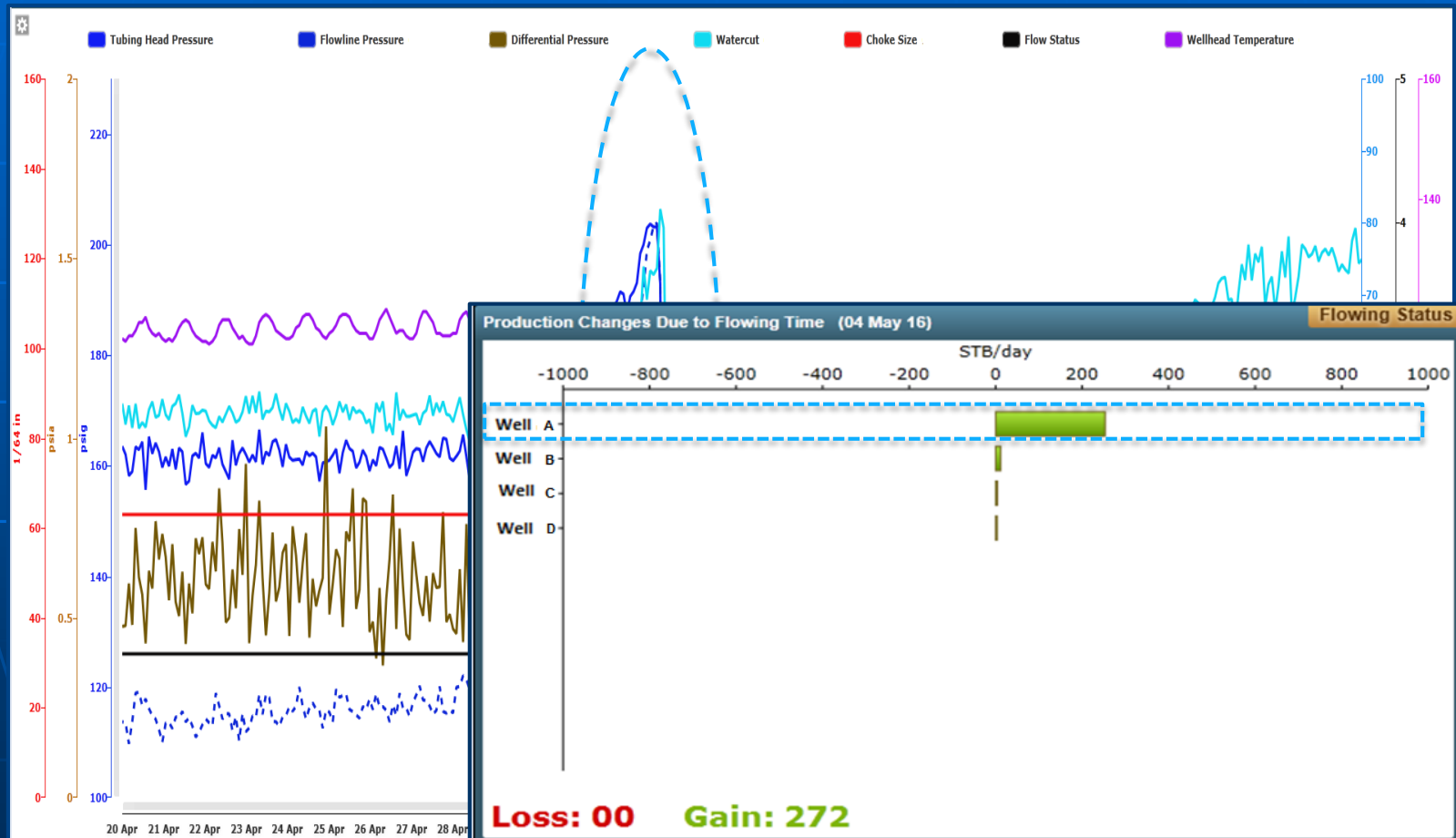
Integrated Services

Kuwait Integrated Digital Field (KwDIF- GC01)
KOC Burgan Field - Kuwait

KwDIF Example



KwDIF Example contd.



FLOW MEASUREMENTS (IoT enabled)



**Red Eye
Water-Cut
Meter for
Surface**



**Red Eye Water-
Cut
Meter for
Subsea**



**VS/R Wet-Gas
Flowmeter**



MPFM

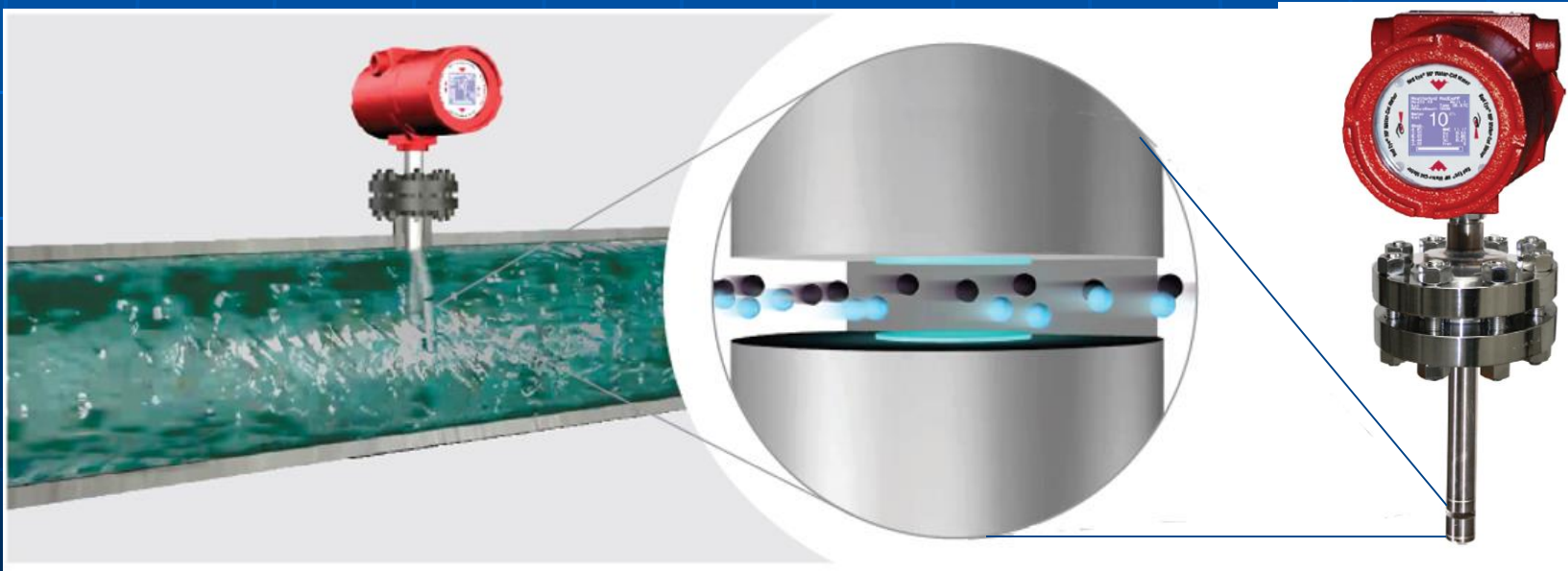


REMMS

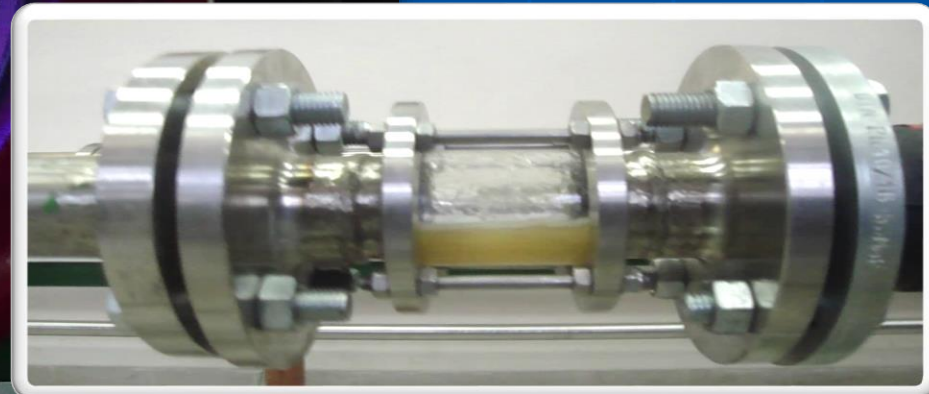
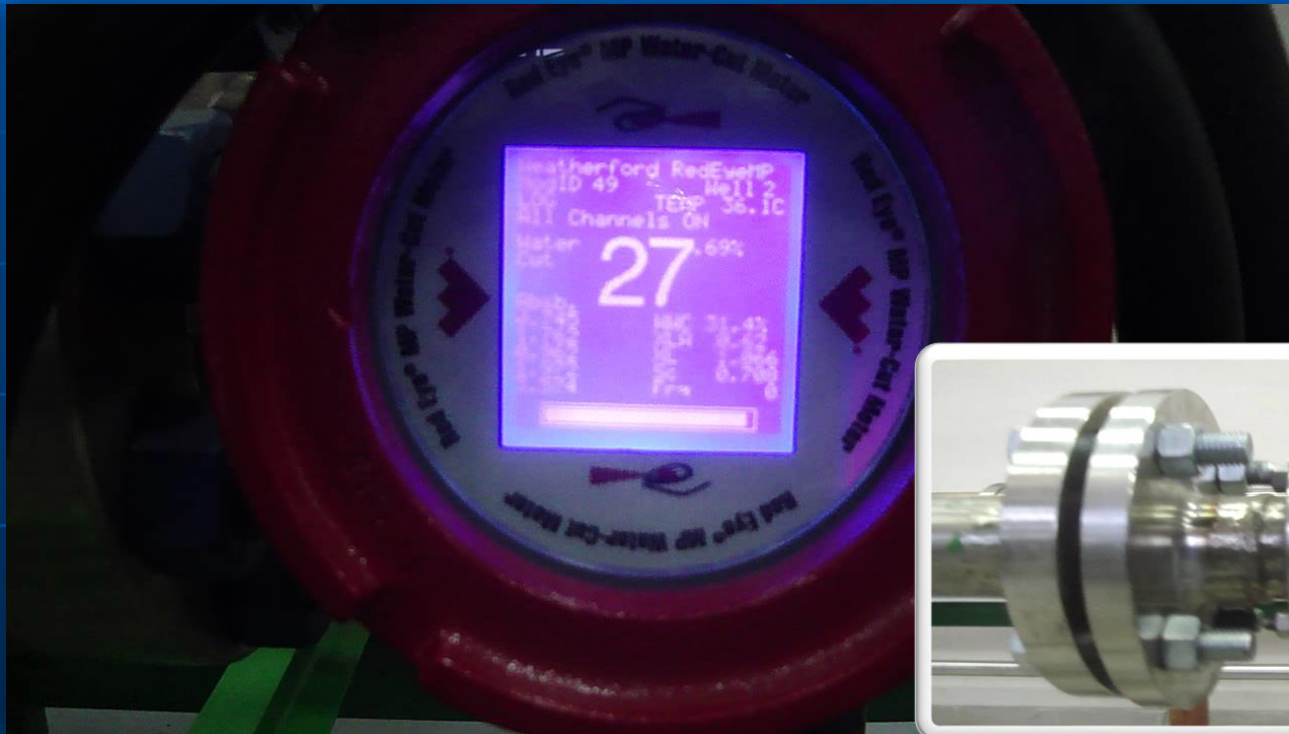


Red Eye® Technology

- Near Infrared Spectroscopy



Red Eye MP - High GVF example



VSRD Multiphase Flowmeter



SONAR ARRAY
Measure total
mixture
flow velocity



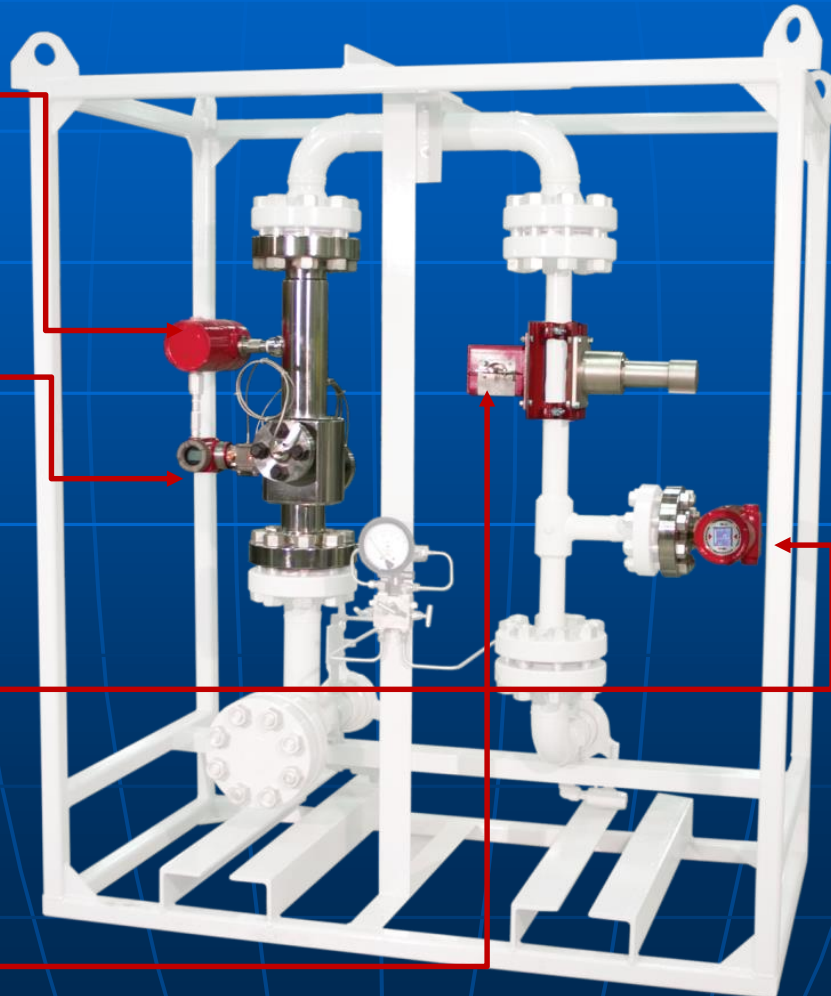
VENTURI NOZZLE
Measures flow
momentum with
well defined over-
reading as a
function of
wetness



**RED EYE
WATER-CUT
METER**
Measure water
content in a liquid
or multiphase
stream.



**GAMMA
DENSITOMETER**
Measures mixture
density



FLOW COMPUTER
Zone 1 or 2 –
touchscreen, RS485
connectivity. Data
logging or Master
hookup

Real Time Multiphase Flow Metering - Key Drivers

2
2



REDUCE
CAPEX



REDUCE
OPEX



REDUCE
HSE
Impact



INCREASE
DATA
ACCURACY



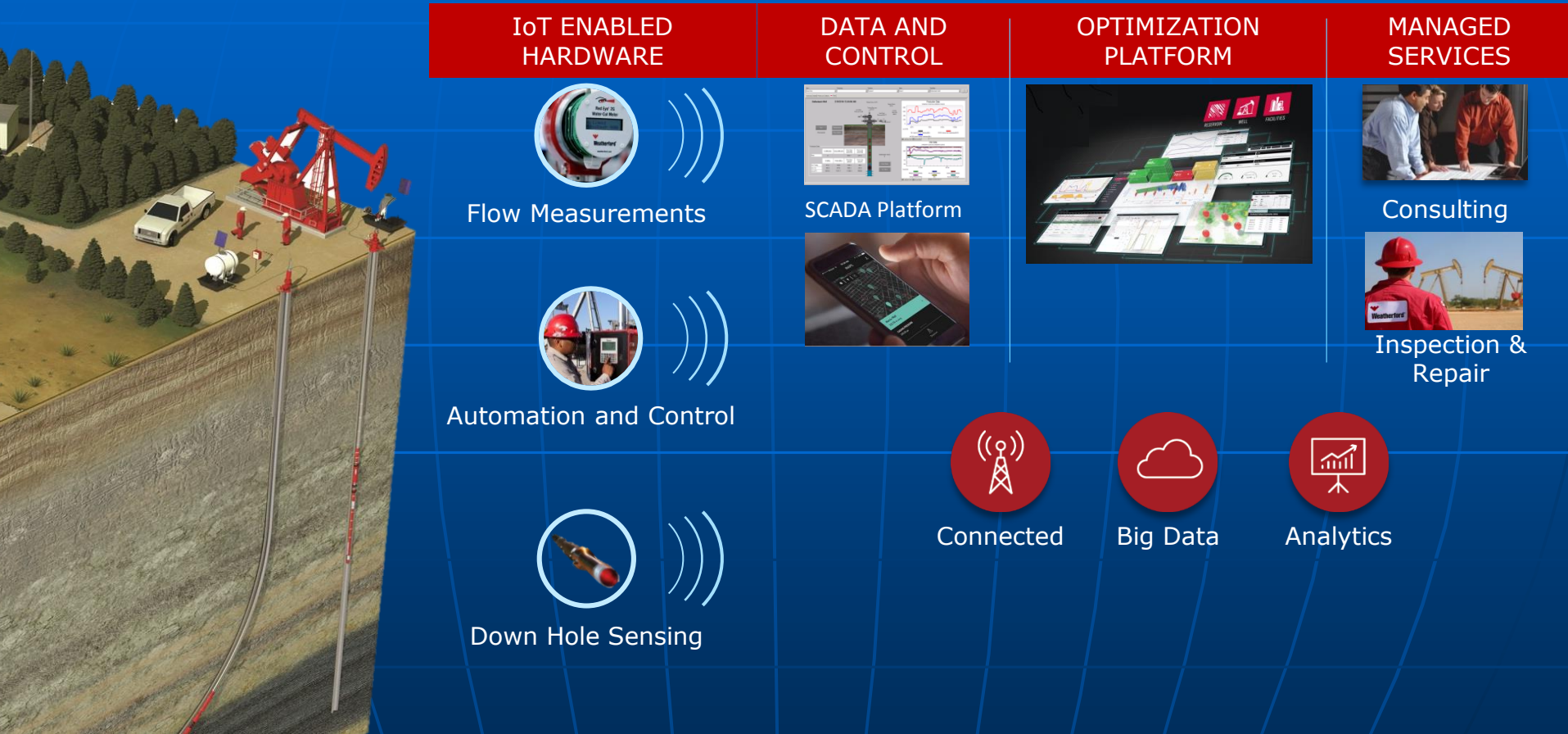
ENHANCE
UNDERSTANDING
AT WELLHEAD



MANAGE
SLUGGING
FLOW



Production Management Solutions



CONNECTED PLATFORMS for ASSET OPTIMIZATION & FIELD SERVICES MANAGEMENT