



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

DIGITALIZATION

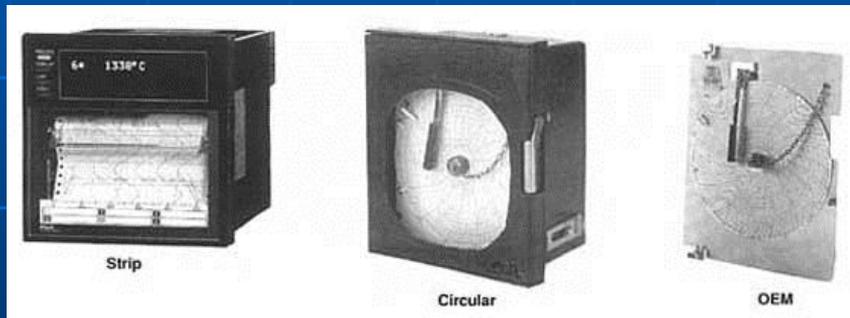
- Taking content or processes that used to be primarily (or entirely) physical or analogue and transforming them to be primarily (or entirely) digital.
 - Data Devices
 - Data Science
 - Economics of Long Tail (Anderson, 2004)



CHART (P/T) RECORDER

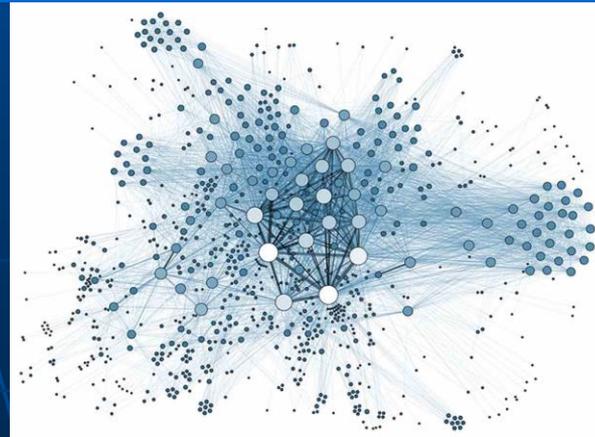
Earlier versions

Digital version

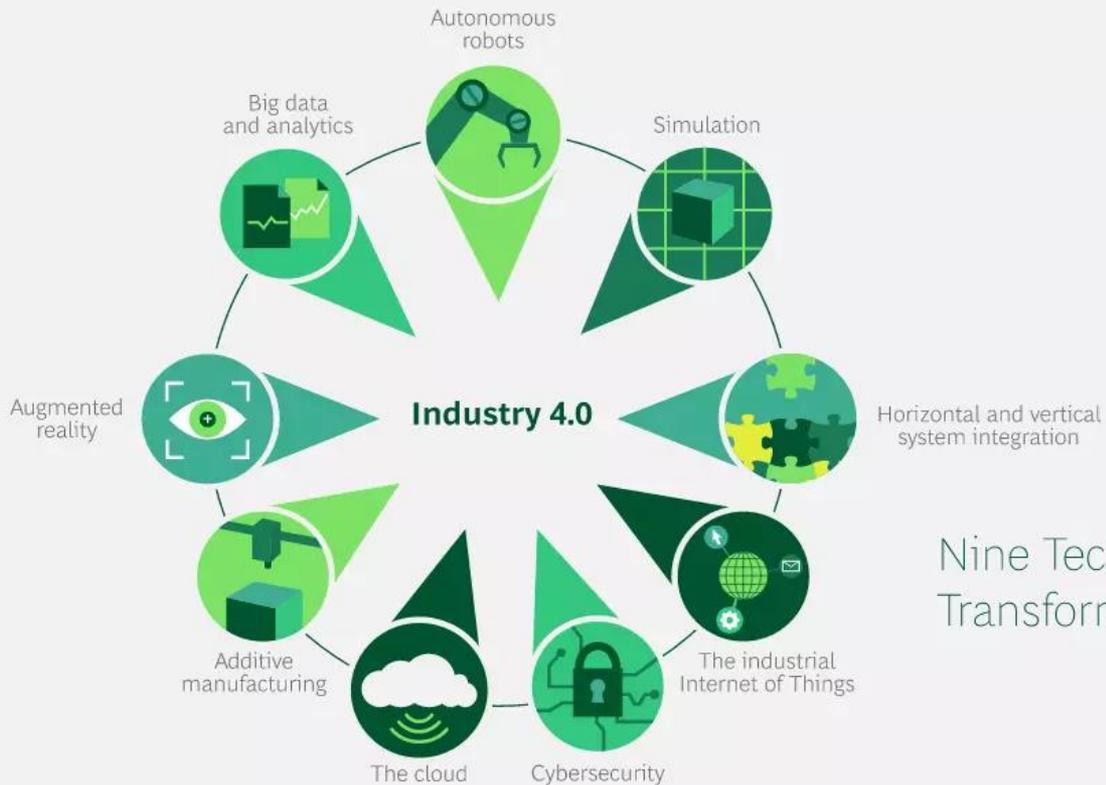


NETWORK EFFECTS

- 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

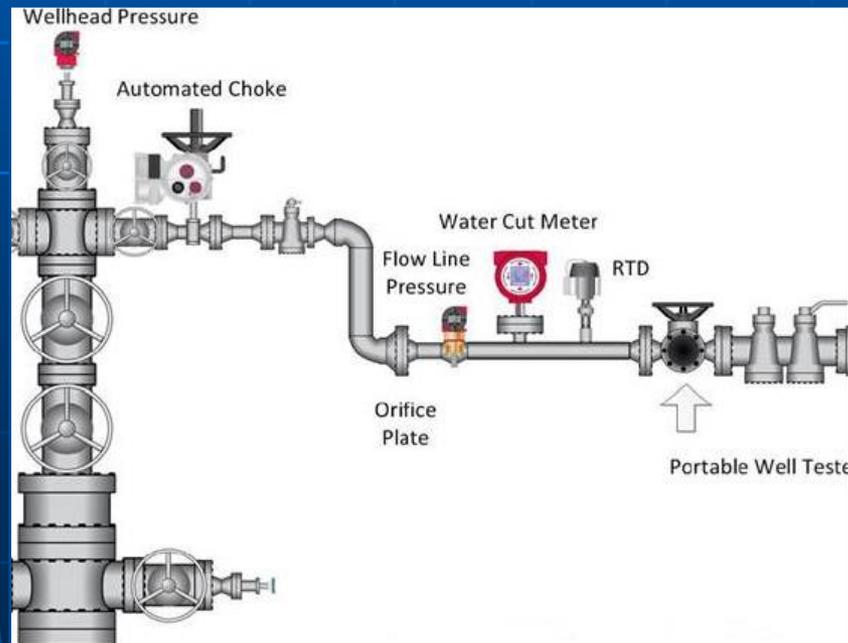


Nine Technologies Are Transforming Industrial Production

Source: BCG analysis.

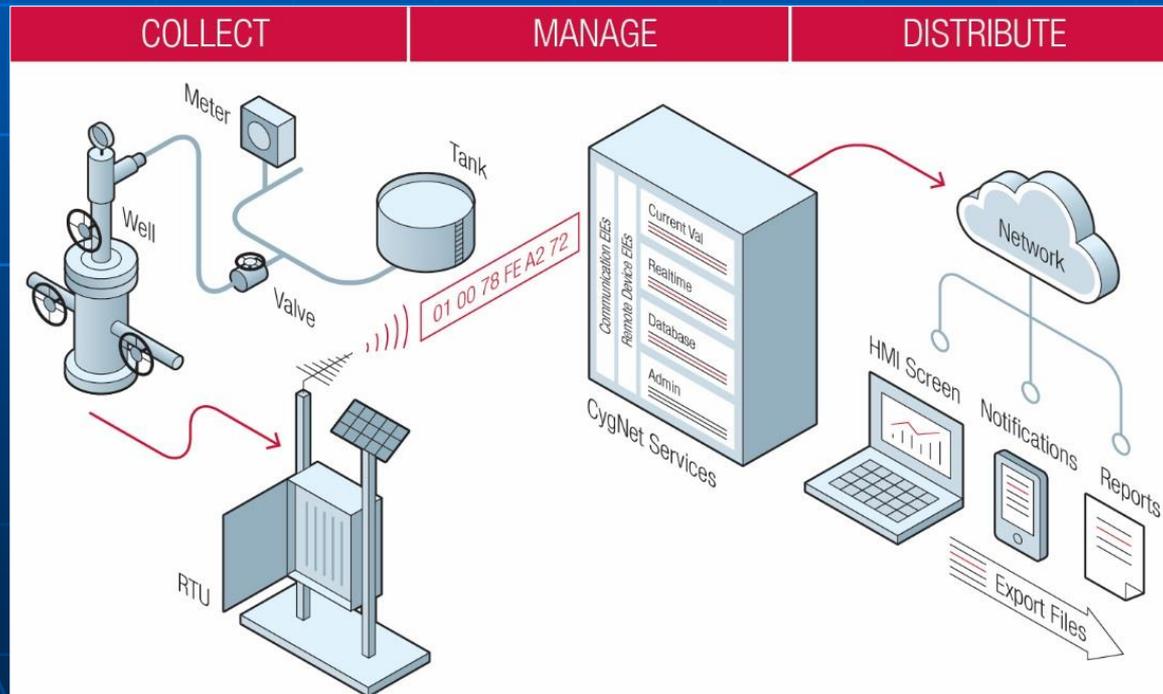
Internet of Things (IoT) Instrumentation

- 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



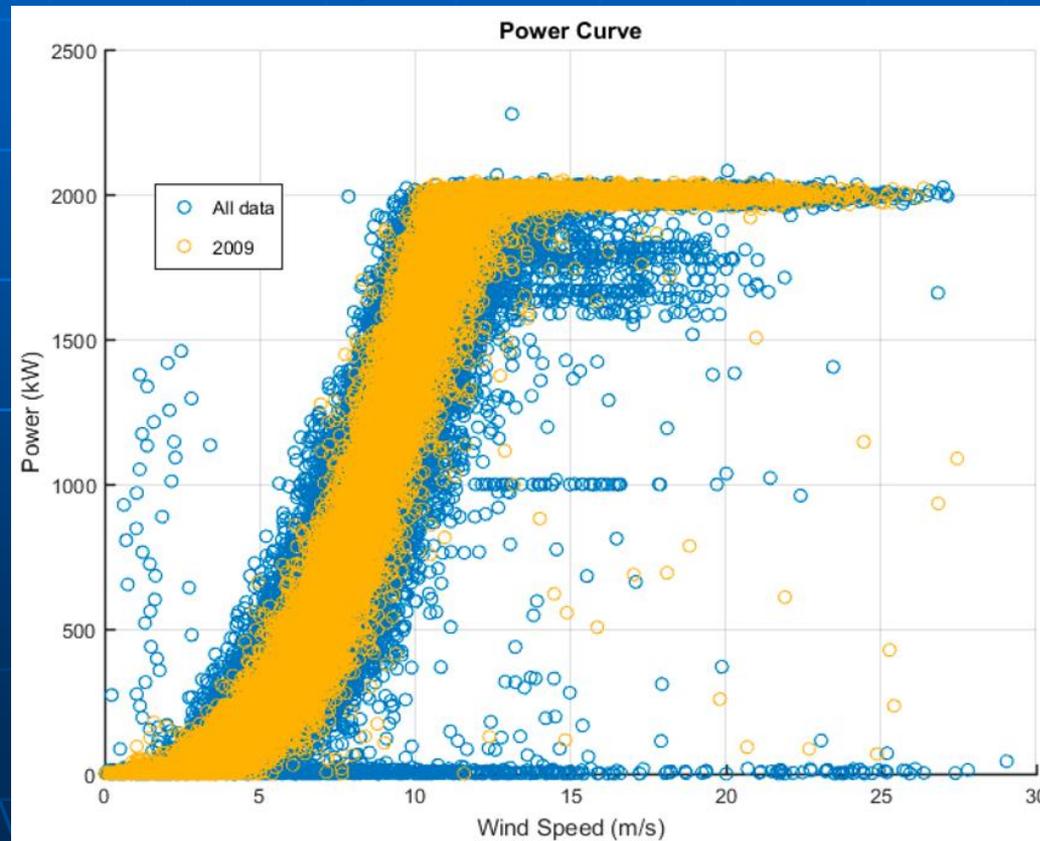
AUTOMATION

- Data
- Communication
- Optimization
- Control

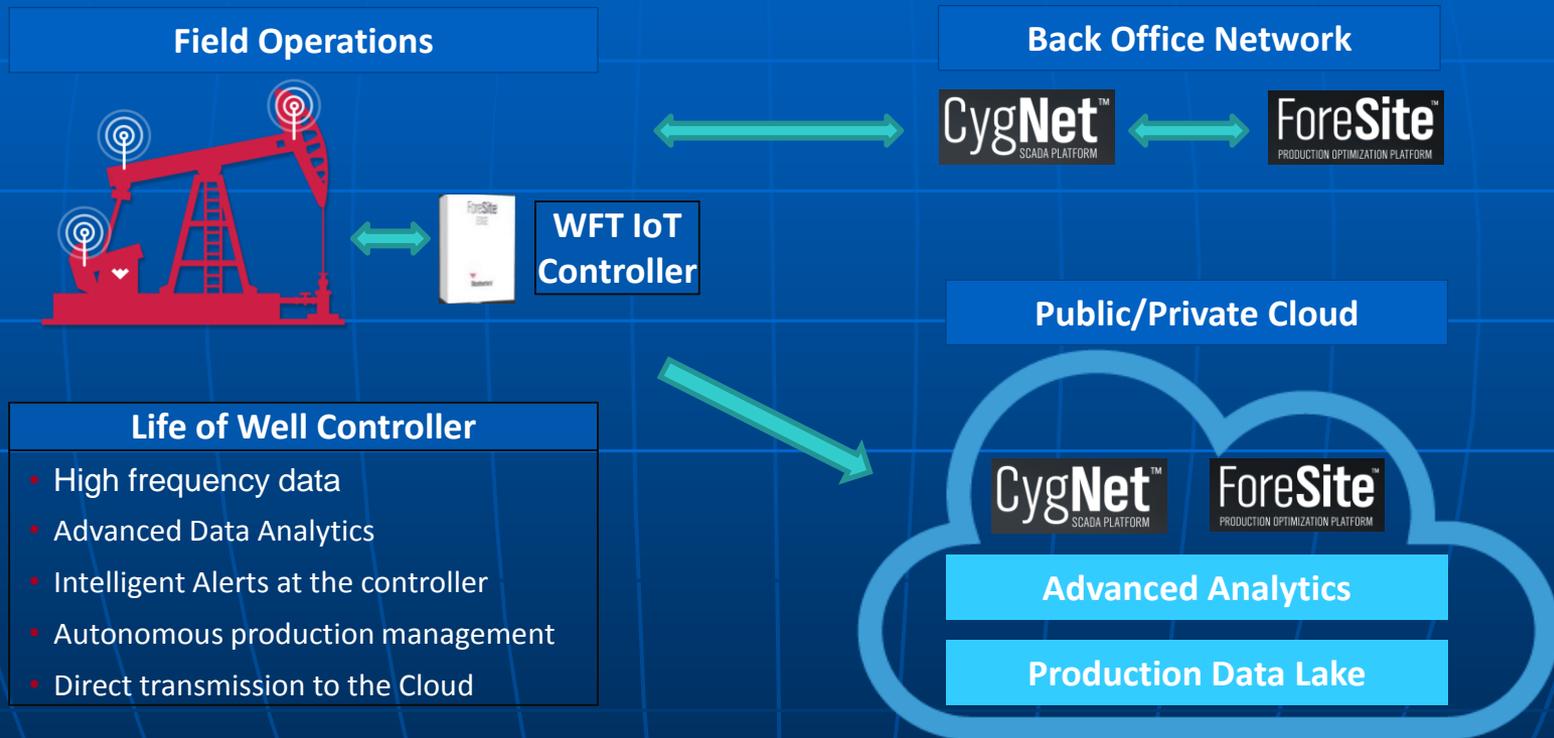


DATA ANALYTICS

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



CLOUD & CYBERSECURITY



PRODUCTION 4.0

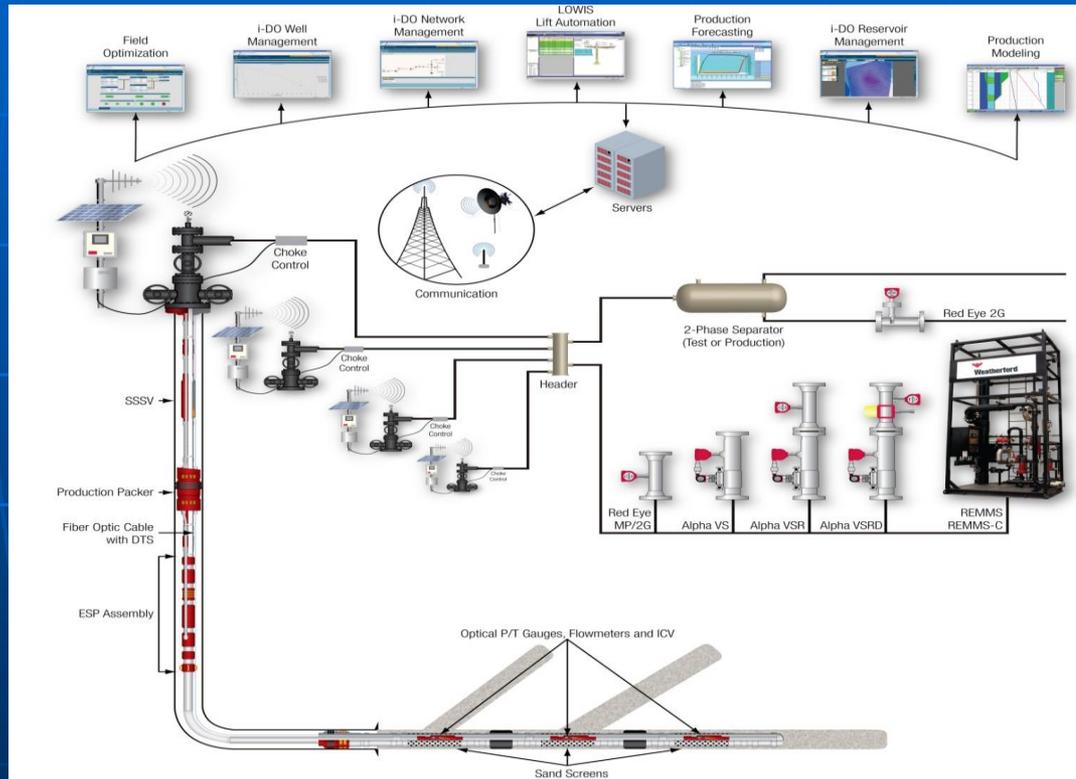


Digital Oilfield - Includes Flow Technology

Analyze & Optimize

Data & Control

Hardware



Optimization

SCADA

Field Services Management

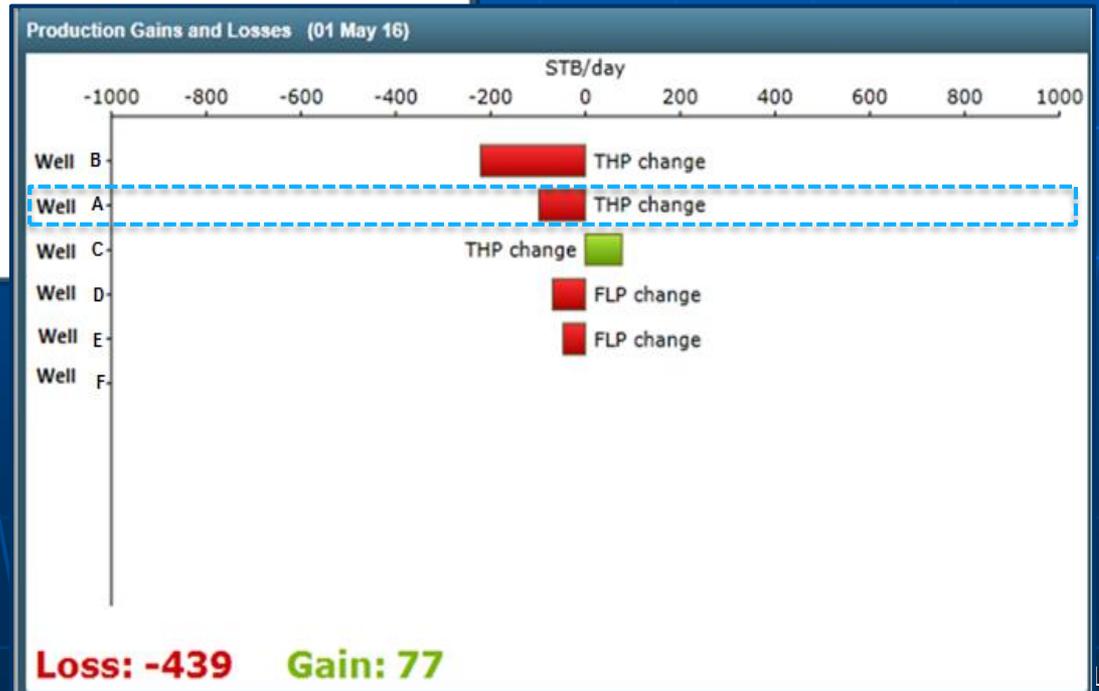
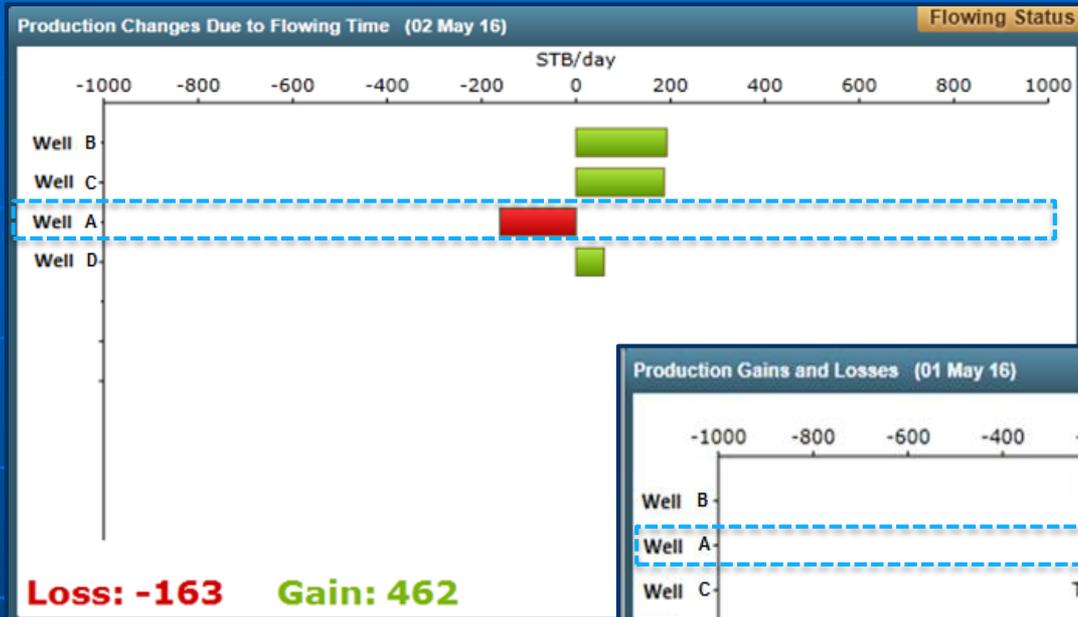


Integrated Services

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**

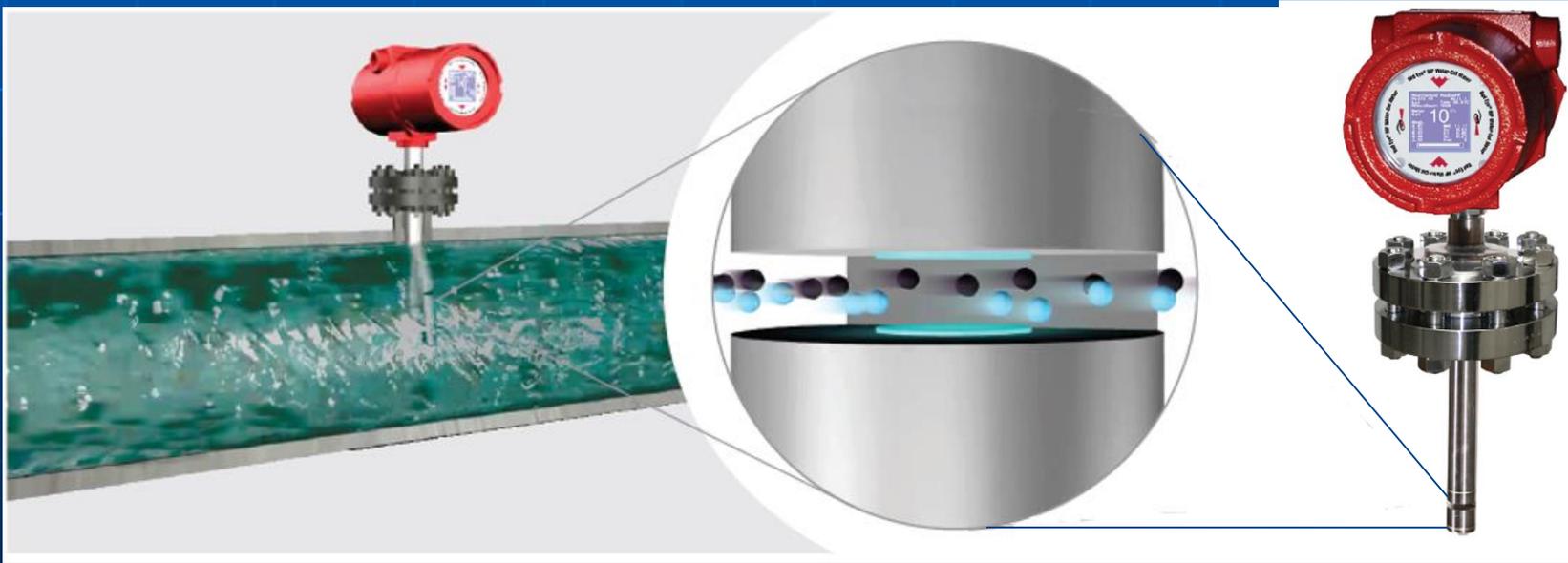
MPFM

REMMS

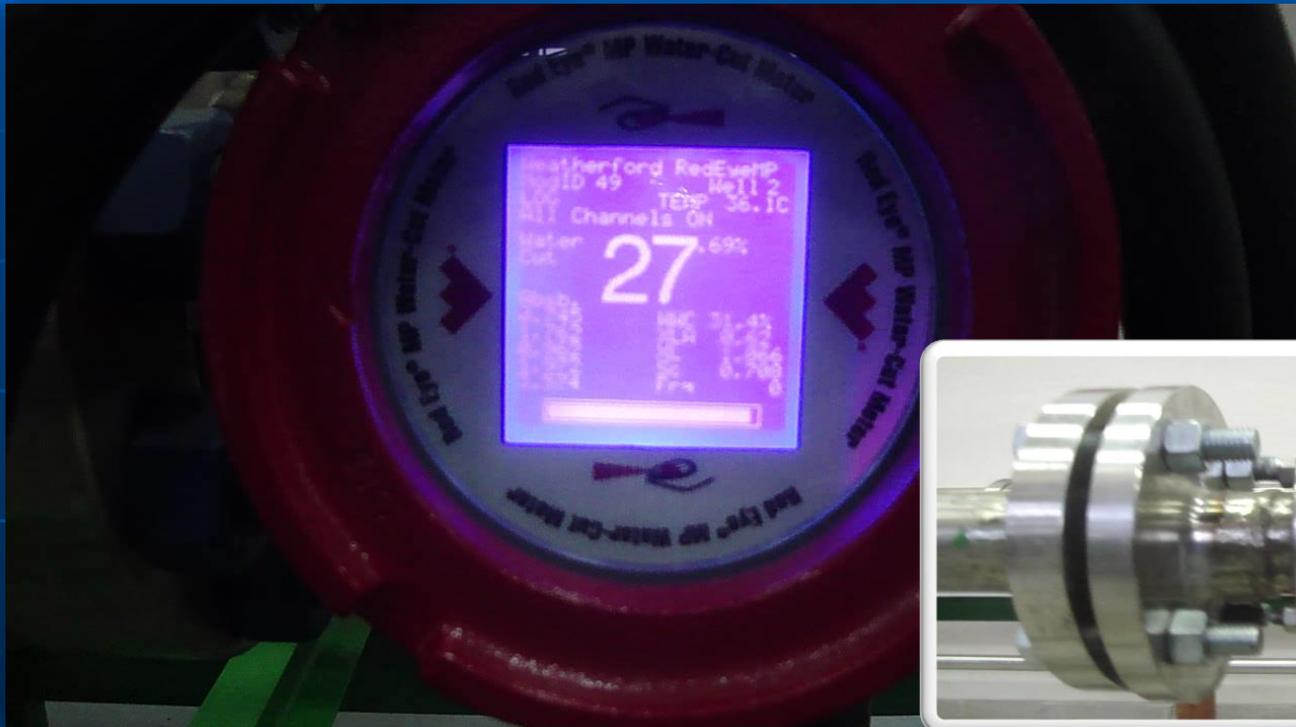


Red Eye® Technology

- Near Infrared Spectroscopy



Red Eye MP - High GVF example



VSRD Multiphase Flowmeter



SONAR ARRAY
Measure total mixture flow velocity



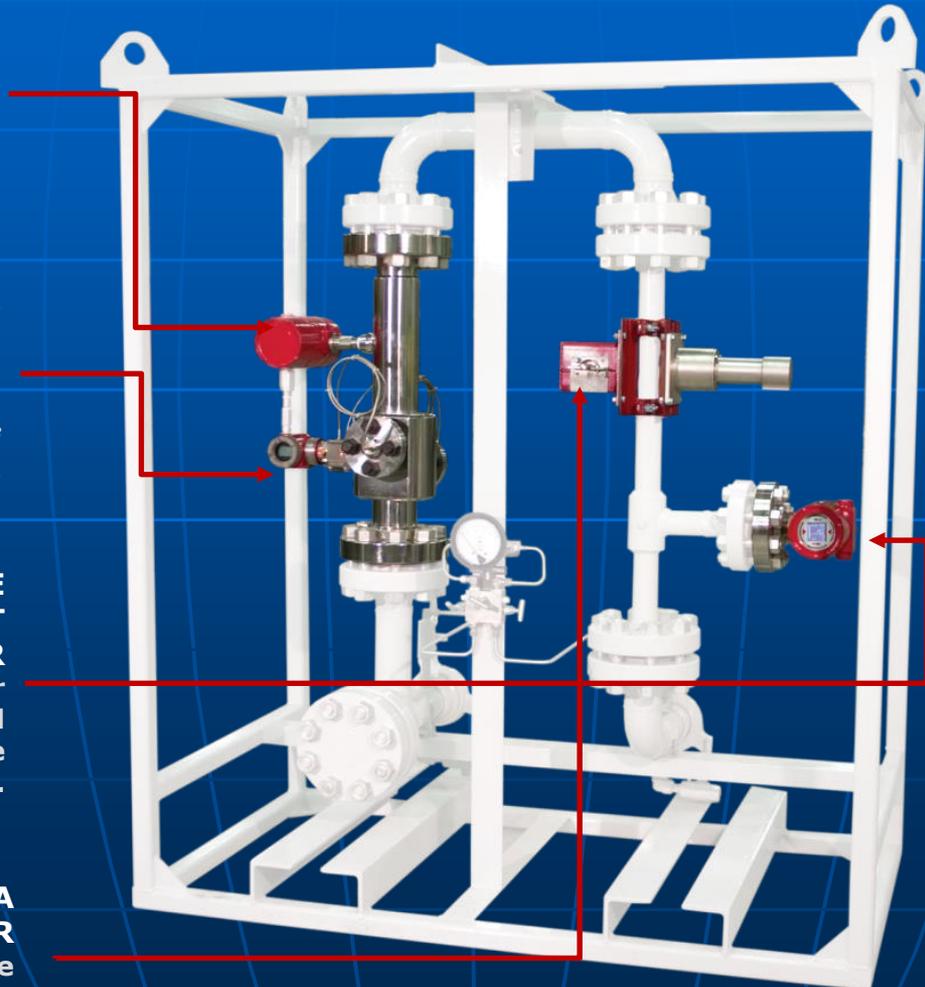
VENTURI NOZZLE
Measures flow momentum with well defined over-reading as a function of wetness



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



REDUCE
CAPEX



REDUCE
OPEX



REDUCE
HSE
Impact



INCREASE
DATA
ACCURACY



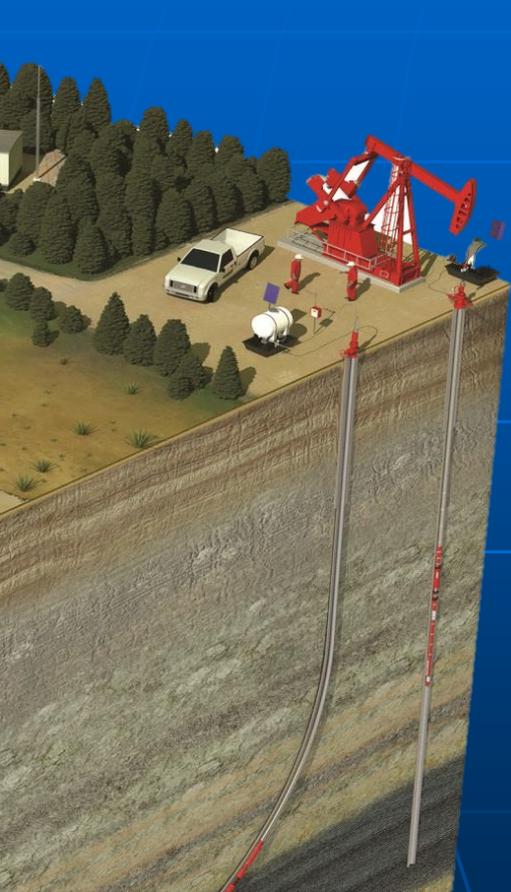
ENHANCE
UNDERSTANDING
AT WELLHEAD



MANAGE
SLUGGING
FLOW



Production Management Solutions



IoT ENABLED HARDWARE



Flow Measurements



Automation and Control



Down Hole Sensing

DATA AND CONTROL



SCADA Platform



OPTIMIZATION PLATFORM



MANAGED SERVICES



Consulting



Inspection & Repair



Connected



Big Data



Analytics

CONNECTED PLATFORMS for ASSET OPTIMIZATION & FIELD SERVICES MANAGEMENT