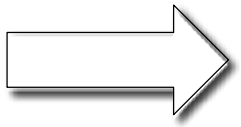
Digital Transformation and the IIoT

Presented by: **Cindy Crow**
Global Industry Principal Oil & Gas

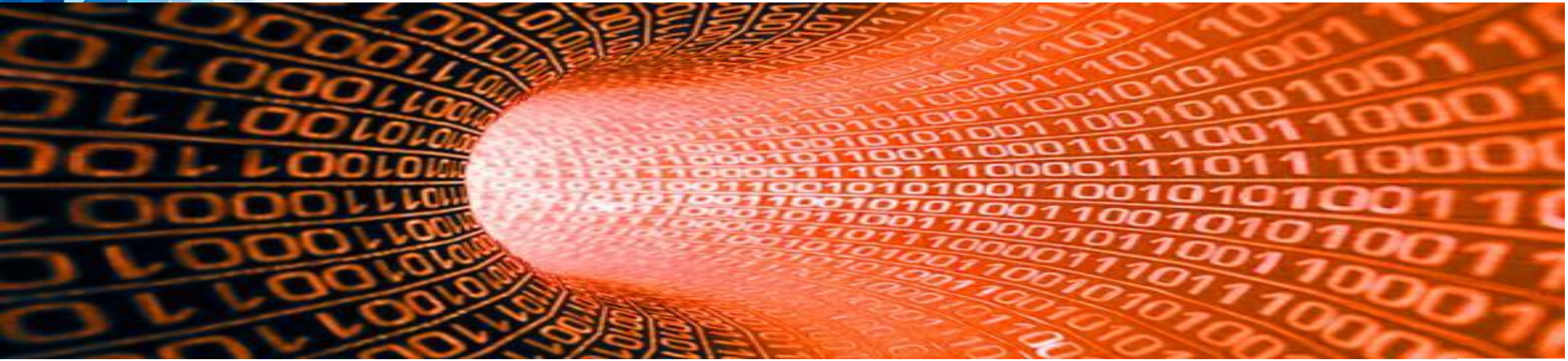
What the Industrial Internet of Things Looks Like Today



“Today, your cell phone has more computer power than all of NASA back in 1969, when it placed two astronauts on the moon.”

-Michio Kaku

Today's Summary



Our main focus was the digital transformation.

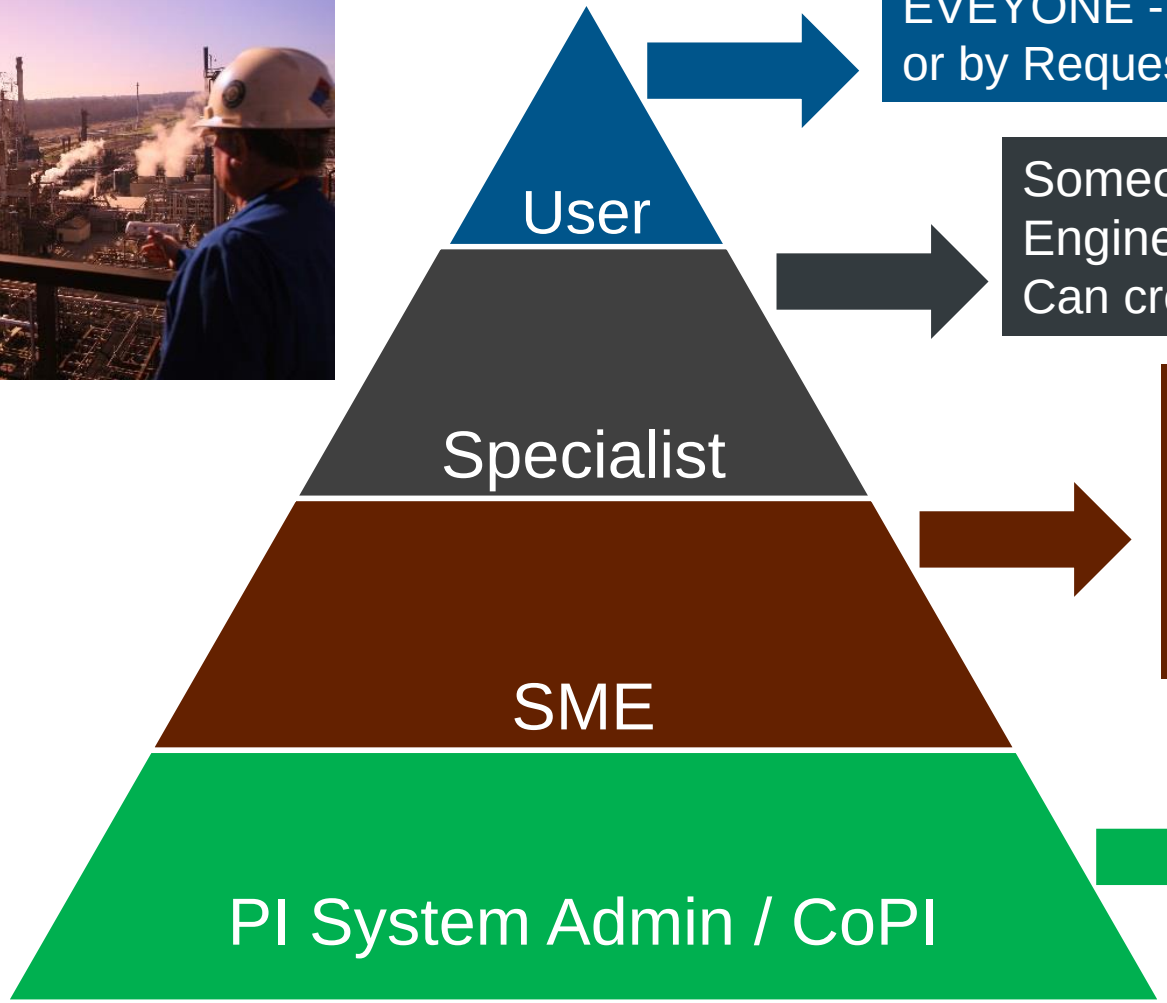
What does that mean?

According to Wikipedia: **Digital transformation** is the change associated with the application of digital technology in all aspects of human society.

Digital transformation may be thought of as embracing digital technologies:

digital competence → digital usage → digital transformation

Minerva Utilization – Training Levels



EVEYONE - Minimal training required. Online Resources or by Request

Someone who works in the System. Process Engineers, Analyst. Trained in both intro classes. Can create and share tools.

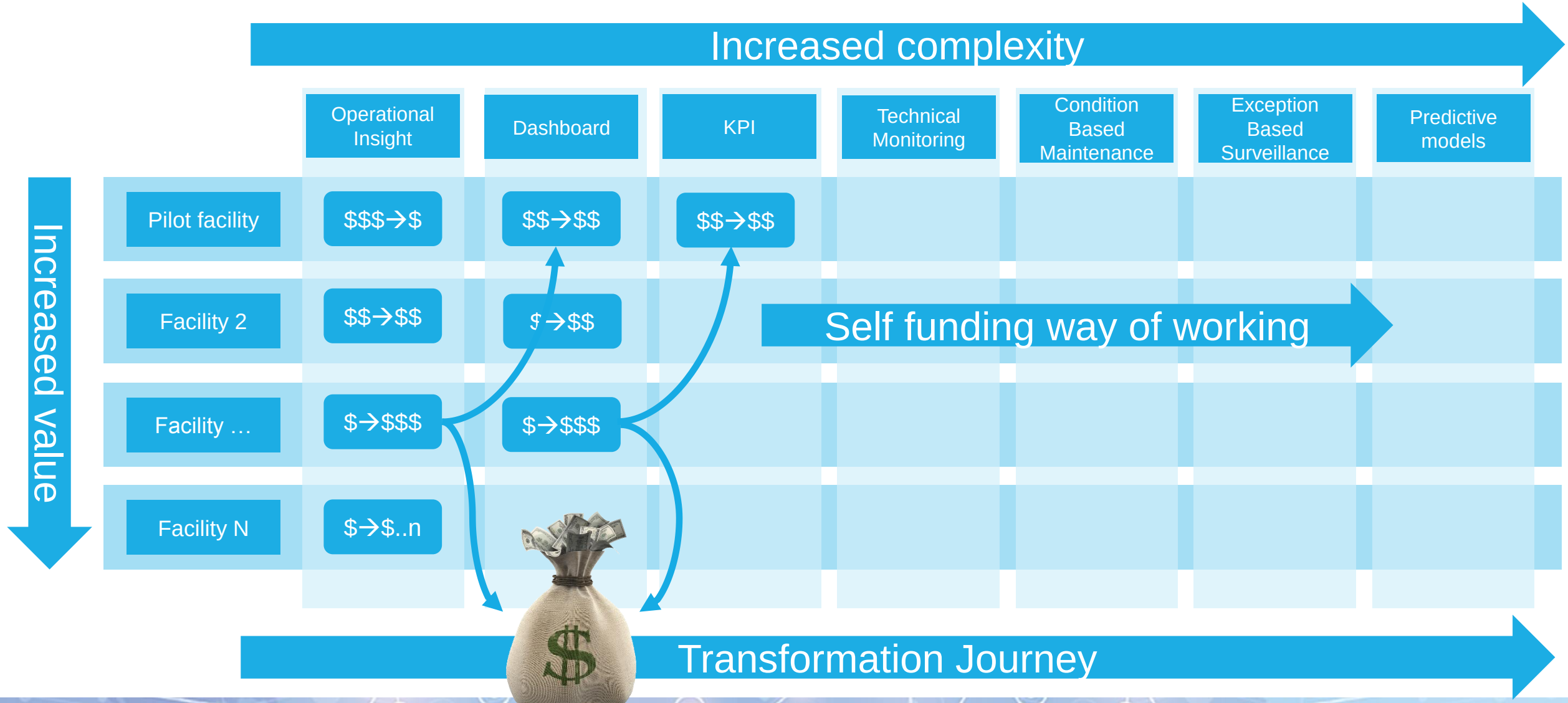
A specialist that gets to the next level. The go-to person in the department. Trained in both intro classes. Proficient in tool creation. Can train Users and assist Specialist.

Coordinators of Process Information – full time in Minerva / PI System Expert Level Training Three weeks classroom Six Months Full Time Experience

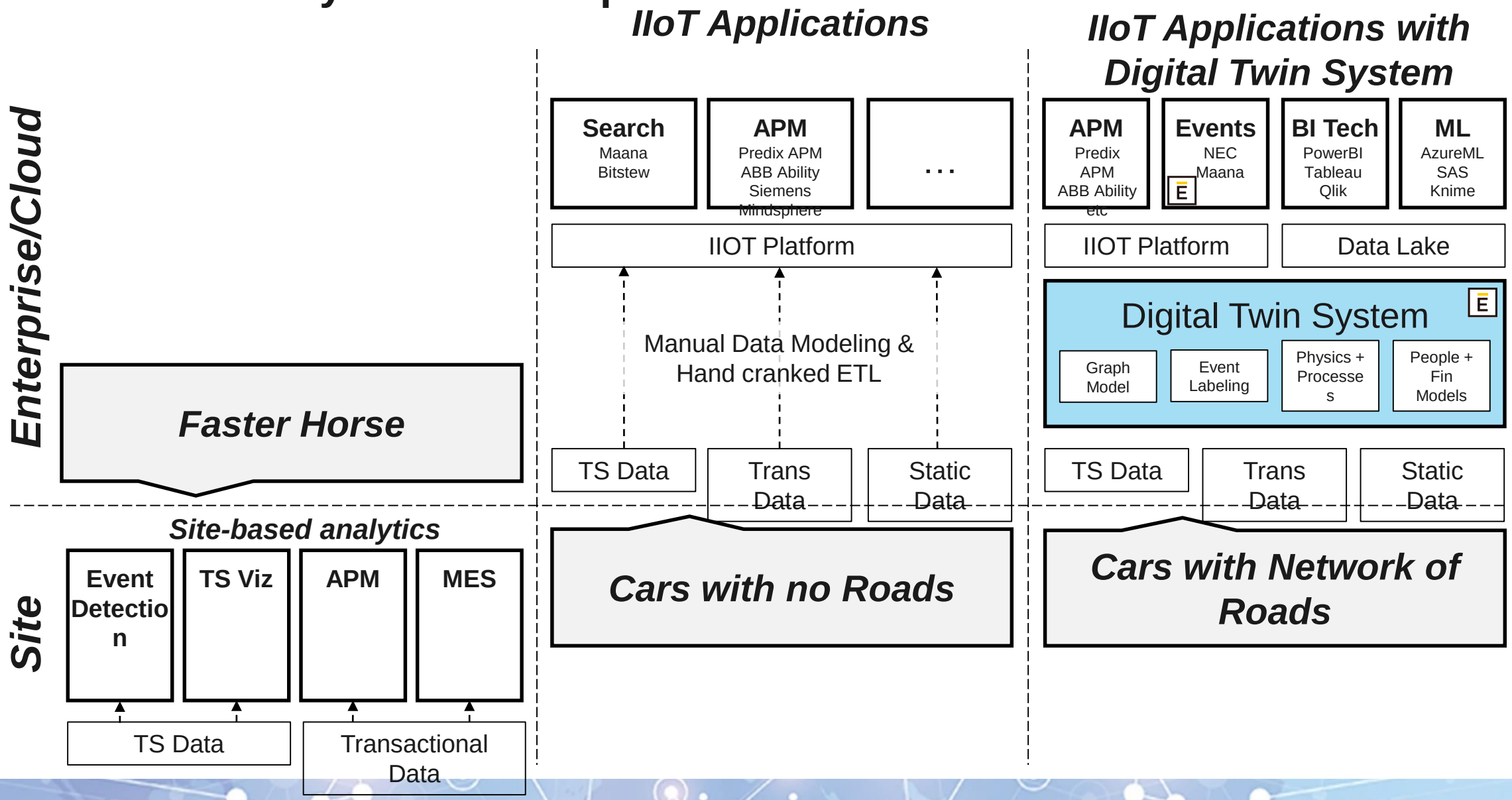
Know your Business Challenges

- Operational Excellence
- Asset Integrity & Reliability
- Predictable Delivery
- Empowered People

Build a Vision, Strategy and Approach



The IIoT Analytics Landscape



From Swamp to Data Lake

Community Data

Time Series Data

Integration

Data Lake

ETL

Business Data

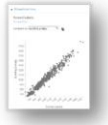
Real-time Operations

Enterprise Insights

Business Intelligence

Operational Intelligence

Real-time Monitoring



Analytics

Vendor Applications

3rd Party Services

Context and Structure

Time series Data Infrastructure

Enterprise Intelligence & Data model

Dashboards

Reports

Machine learning

Artificial Intelligence

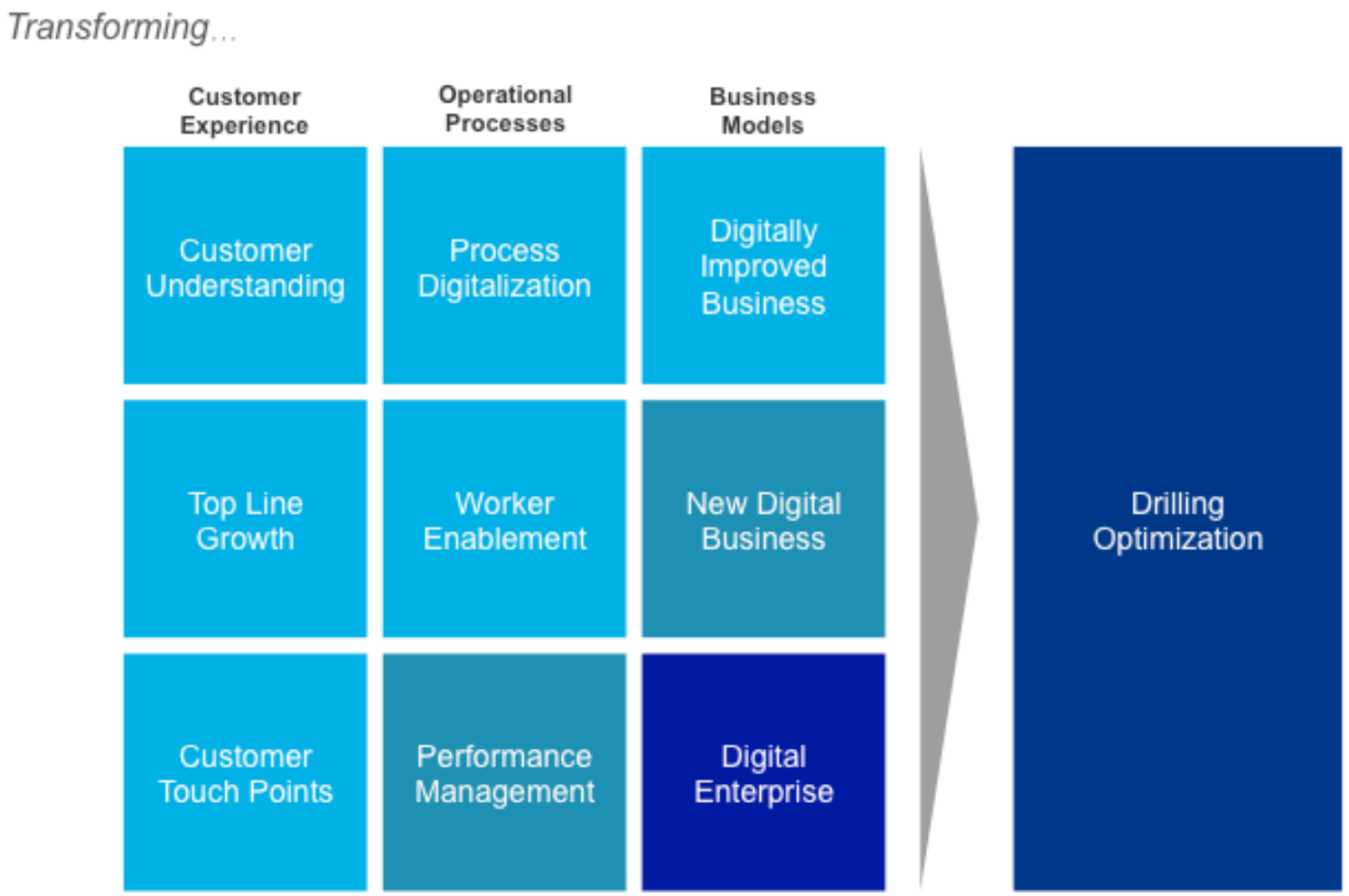
Modelling and simulation

ERP

HCM

CRM

A Digital Transformation Journey toward Drilling Optimization



But Digital Transformation in itself has its own set of challenges too..

Data Management

- Data capturing and data cleansing
- Data normalization
- Data Management Policy and Governance
- Data Sharing Management and Cyber-Security

IT Infrastructure Management

- OT and IT governance
- Scalability, Availability, and Standardization
- Multiplicity of platforms with varying degrees of quality
- Platform architecture: edge, fog and cloud levels.

Knowledge Management

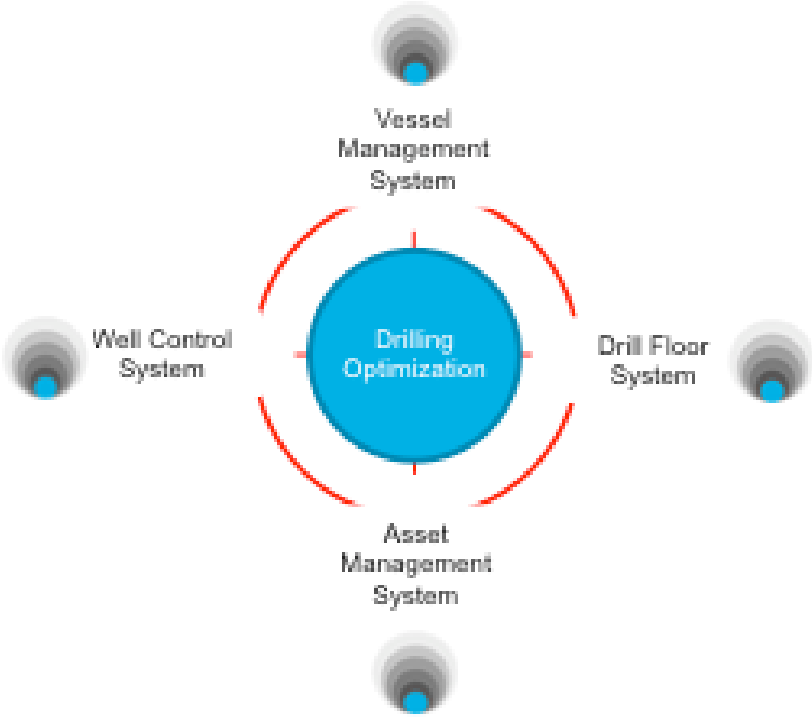
- Too many platforms competing for attention… … too many solutions looking for a problem
- Novel business models trying to position themselves to provide value-added services based on knowledge harvested.
- Lack of understanding of analytic needs

Business Factors

- Business model delivery, governance, execution and control
- Competitive landscape
- Regulatory environment
- Customer Policies
- Liability and other legal elements.

Putting it all together

A Systems of Systems Approach

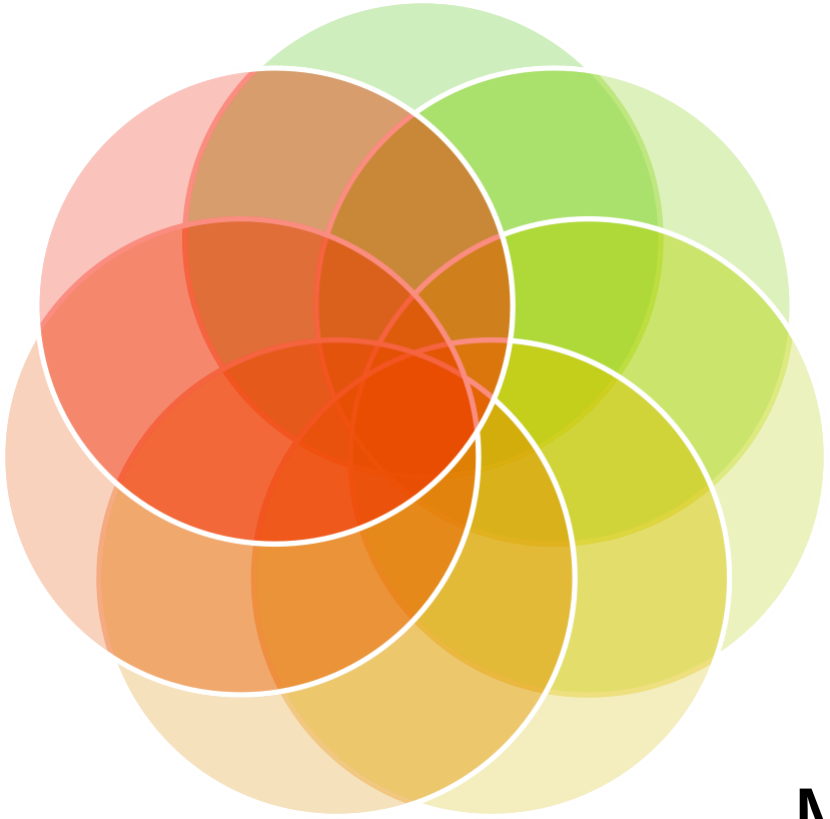


Business Strategy driving the Digital Transformation

We Are Getting More Connected

Your Challenge- Buzz Words

- IIoT
- BIG Data
- Analytics

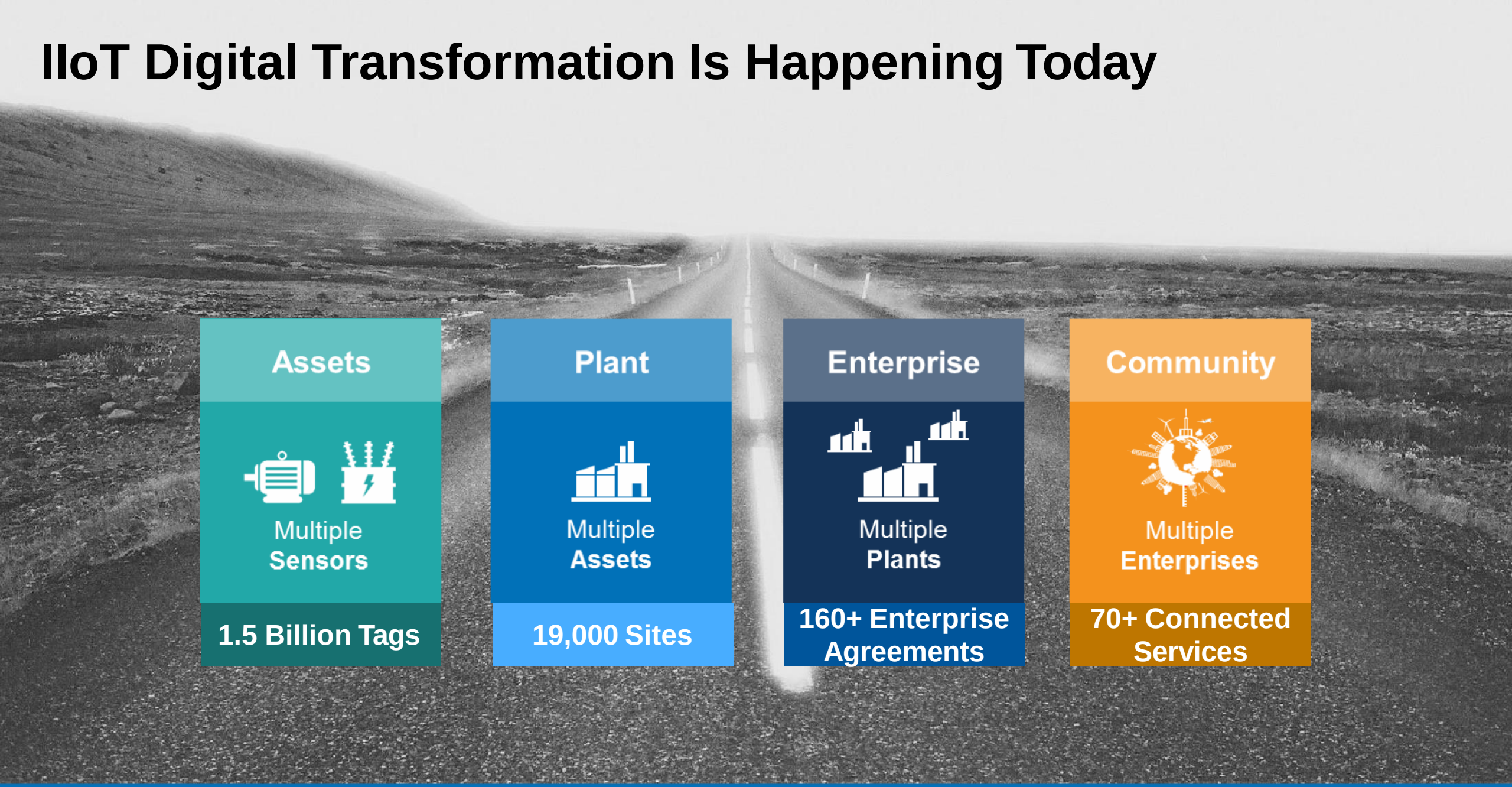


Industry 4.0

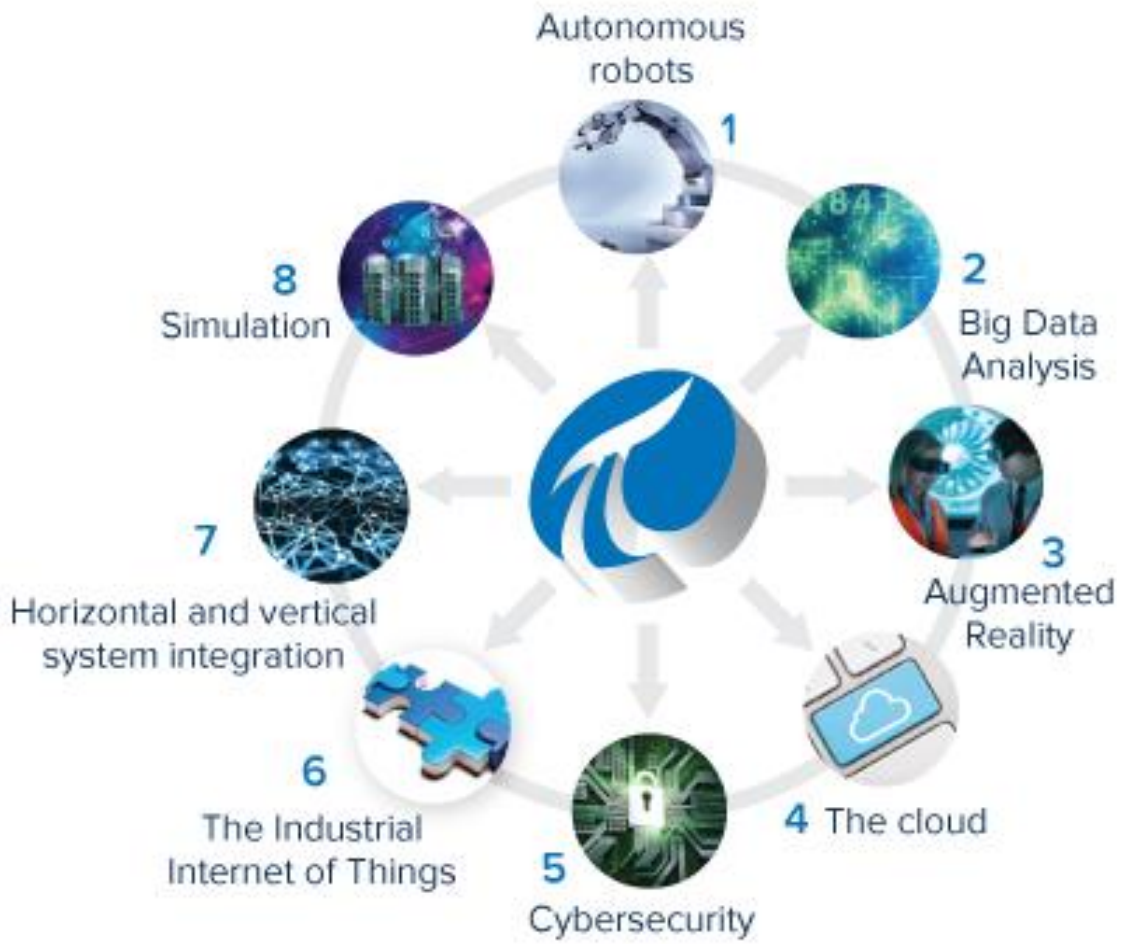
Cloud

Mobility

IIoT Digital Transformation Is Happening Today



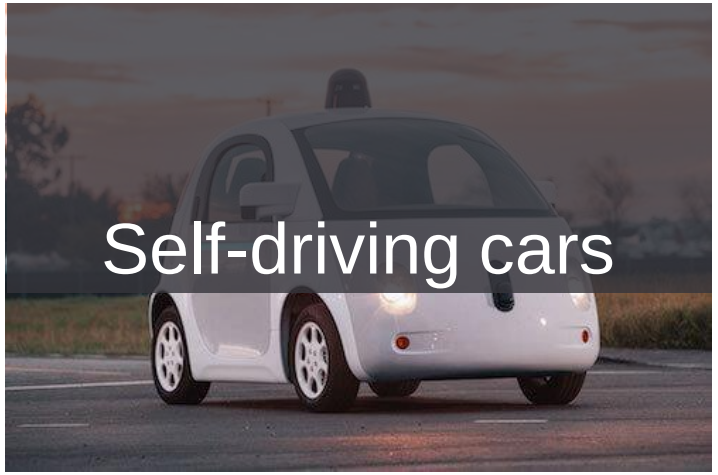
OSISOFT'S 8 ENABLERS OF INDUSTRY 4.0

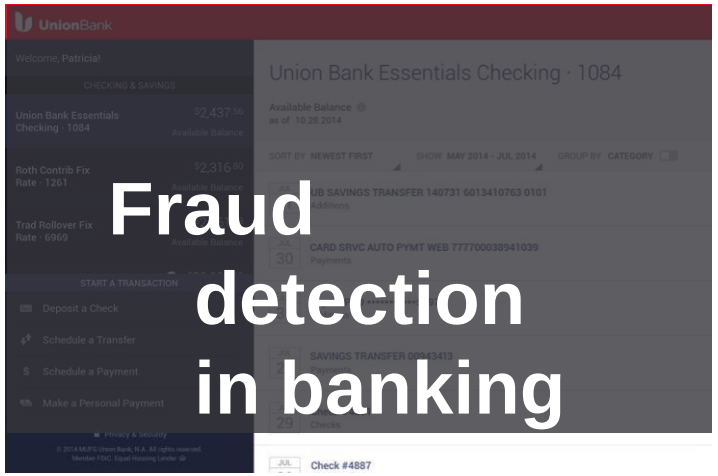


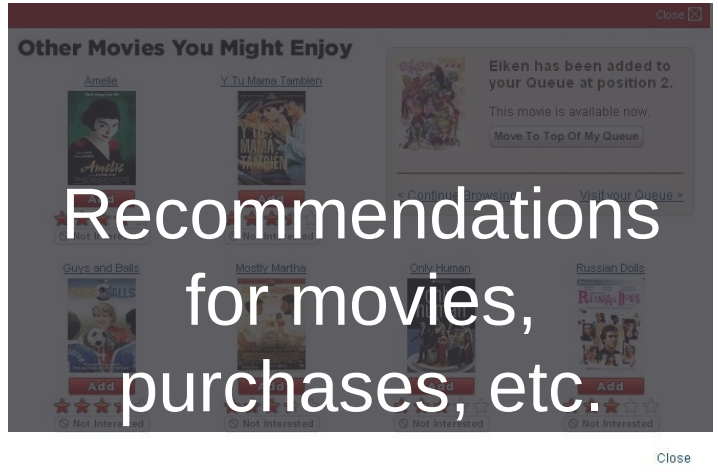
Boston Consulting Group (BCG)
http://www.consultancy.uk/news/2099/bcg-industry-40-to-lift-manufacturing-to-new-levels

1. Real-time connectivity and monitoring
2. Analytics ready historical data
3. Open access to real-time and historical data for reality development
4. Cloud based data exchange and Web based connectivity
5. Three decades of hardening against security threats
6. End to end connectivity from edge devices to analytics applications
7. 450+ options for real-time, historical, and transactional data connectivity
8. Seamless data transfer between on-line and off-line systems and asset analytics

IIOT and Machine Learning in Our World Today







To name a few…

Machine Learning

Predictive Maintenance on ESPs

Video link to presentation: https://cdn.osisoft.com/osi/presentations/2016-rs-houston-iiot/2016-rs-houston-iiot-090-Element-Analytics-Kalwani-Predictions-Machine-Learning-Data-Lakes-and-Data-Readiness.pdf

Supermajor oil & gas company operating 15+ upstream production units globally

Challenge

- **Revenue loss** due to well downtime resulting from Electric Submersible Pump failures.
- Pumps take average of **30 days to replace**.
- Lack of time to failure insight from remote monitoring services.
- Shrink downtime via advanced warning of pump failure.

Key Questions & Data

- Why, where, when are pumps failing?
- Can we predict failure?
- Operating profile based on what is flowing through well?
- OEM models failing most?
- Role of vibration signature?

Data:

- PI – 100,000 tags
- Maintenance logs
- Facility diagram (locations)
- Well test data
- Fluid composition of wells

Solution & Results

Solution: Predictive model to identify failures 60 days in advance across 1,100 wells in a single production unit. **74,000 tags were mapped in 3.5 hours.**

Results:

- Model captured 60% of failures after 1st training.
- Predictive insights enable targeted maintenance scheduling.
- Reduced outage from 30 to 21 days, avoiding hundreds of down days, avoiding $millions in revenue loss.

ELEMENT ANALYTICS™ OSIsoft. Microsoft

Failure Predictions for Turbine Compressor Sets

Energy infrastructure company, owner/operator of natural gas pipeline systems in North America.

Challenge

- Reduce downtime on gas gathering turbine compressor sets operating in remote locations.
- No leading indicators of when and where failures are taking place.
- Move beyond scheduled or condition-based maintenance into predictive maintenance.

Key Questions & Data

- Why are assets failing?
- How do we tell a sensor failure from a real failure?
- What are features of failures

- PI – 320,000 tags
- Status tags in PI
- Maintenance data from work and asset management system

Solution & Result

- Solution: Predictive model giving dynamic conditional warning to potential compressor failures.

- 32% potential reduction in failure rate and 2-3% increase in uptime.

- Reduced amount of interaction with machines, improving worker safety.

Game Changer

IIoT Game Changer - **Edge Devices**

National Instruments

NI compactRIO

Embedded Controllers

RealWear

DELL

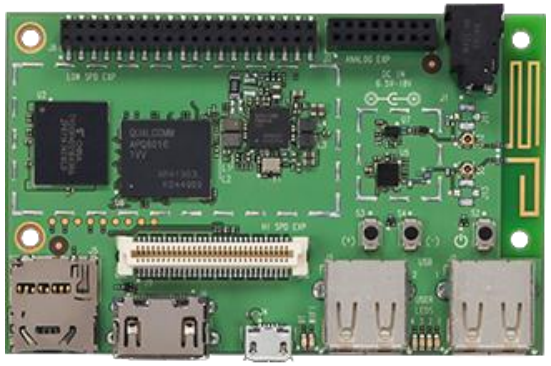
PowerEdge R940

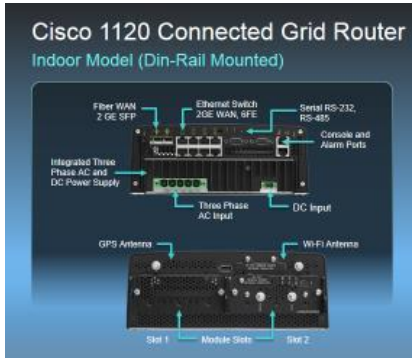
IoT Gateways - Deploying Connectors for IoT

QUALCOMM®

CISCO

intel®





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The Role of IIoT within Industrial Operations

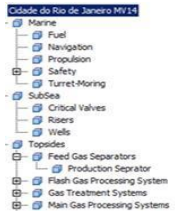
Traditional Operations

Sense

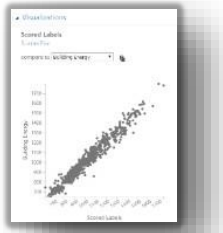
Process/ Control System

Connect

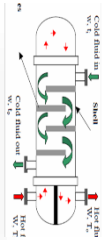
Store



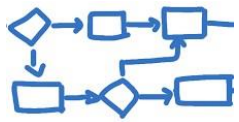
Structure



Analyze



Model



Implement

Automate

IIoT Enabled Operations

Sense

Connect/ Gateway

The Role of the PI System in IIoT

Traditional Operations

Sense

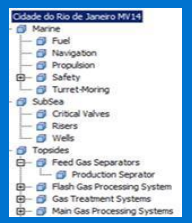
Process/ Control System

PI Connectors

Connect

PI Server

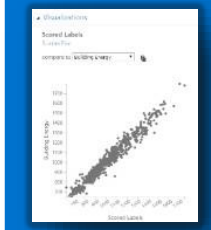
Store



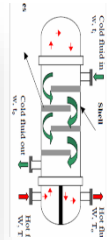
Structure

PI Visualization

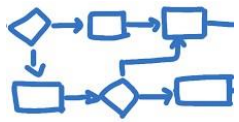
PI Integrators



Analyze



Model



Implement

Automate

IIoT Enabled Operations

Sense

Connect/ Gateway

Monitor what you couldn’t

Integrate new sensor types

Add sensors around existing systems

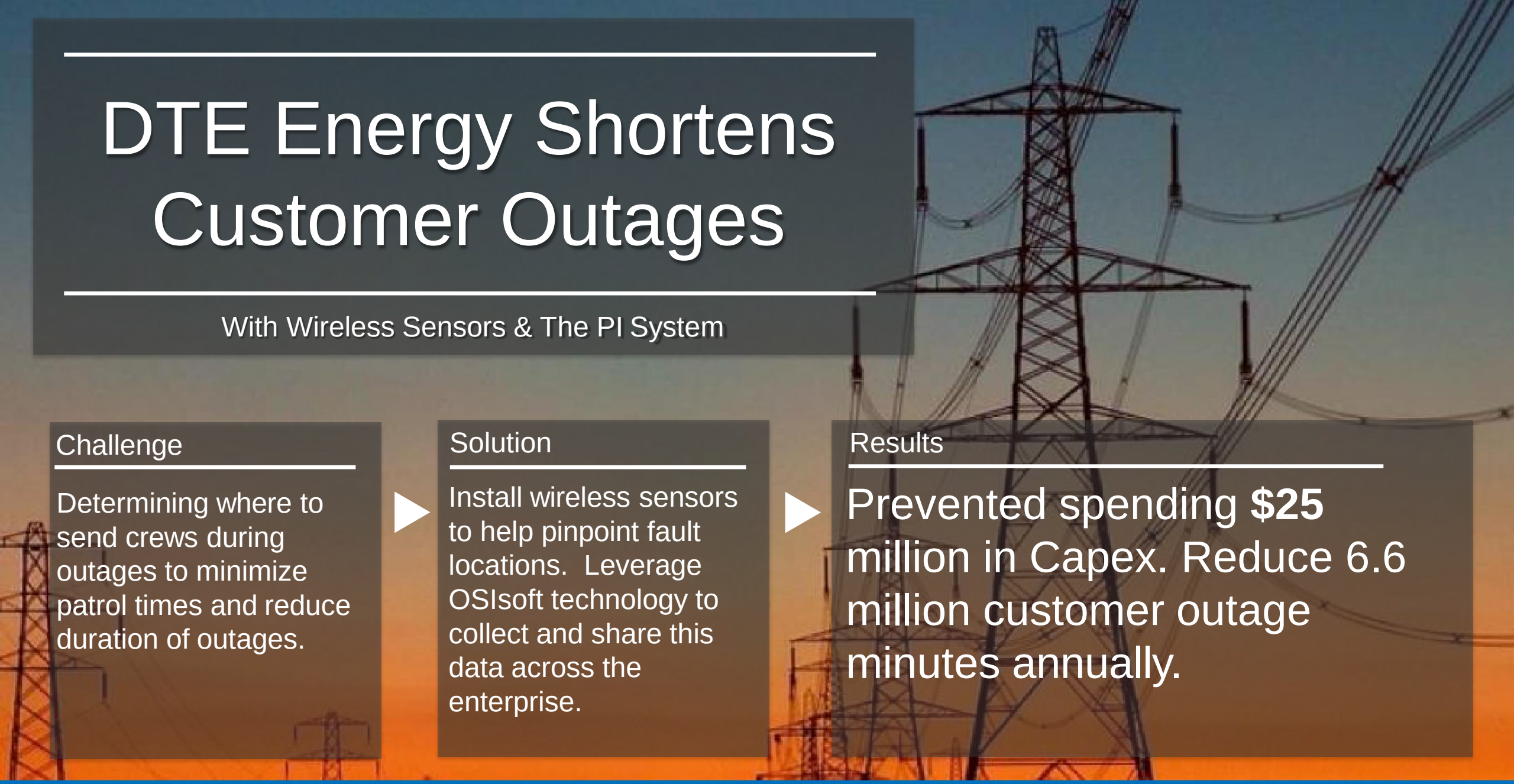
3 Use Cases for “New” IoT

1) Primary Use Case: Now Connect What was Physically and Economically Not Possible Before

…. Remote and mobile assets

DTE Energy Shortens Customer Outages

With Wireless Sensors & The PI System



Challenge

Determining where to send crews during outages to minimize patrol times and reduce duration of outages.

Solution

Install wireless sensors to help pinpoint fault locations. Leverage OSIsoft technology to collect and share this data across the enterprise.

Results

Prevented spending **$25** million in Capex. Reduce 6.6 million customer outage minutes annually.

2) Use Case: New Sensors Outside of Existing Systems

EMERSON

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Search...

Rosemount™ 708 Wireless Acoustic Transmitter with Steam Trap Monitor

Featuring ultrasonic acoustic event detection that mounts externally, the Rosemount™ 708 Wireless Acoustic Transmitter with Steam Trap Monitor offers a fast, cost effective installation. This device allows visibility into steam traps and pressure relieve valves (PRVs) by accurately communicating acoustic level and temperature data as well as device data, event status and leak detection via the *Wireless*HART®network. The Steam Trap Monitor software option provides real-time information about steam trap conditions, energy usage and emissions.

BUY NOW >

CHAT NOW >

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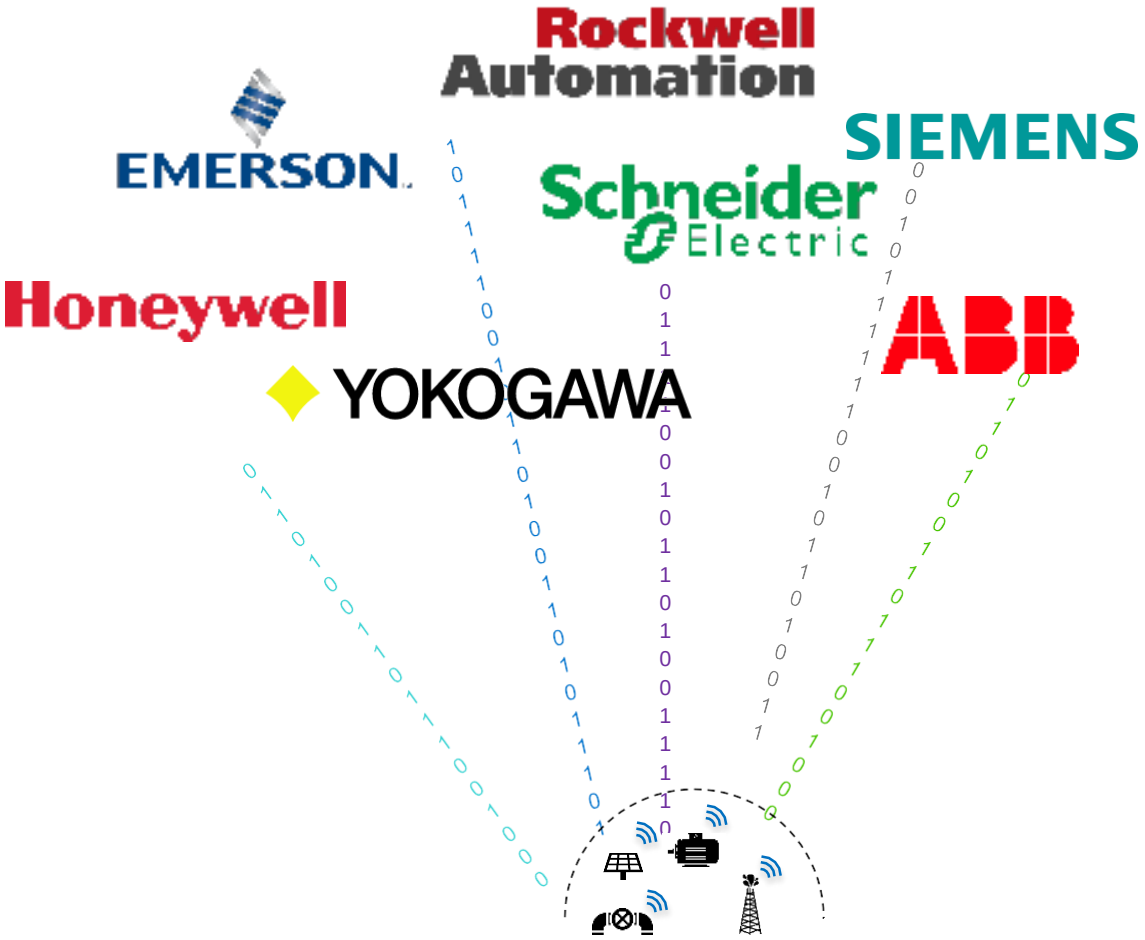
3) Use case: Upgrade existing Systems with new sensors

DTE Energy

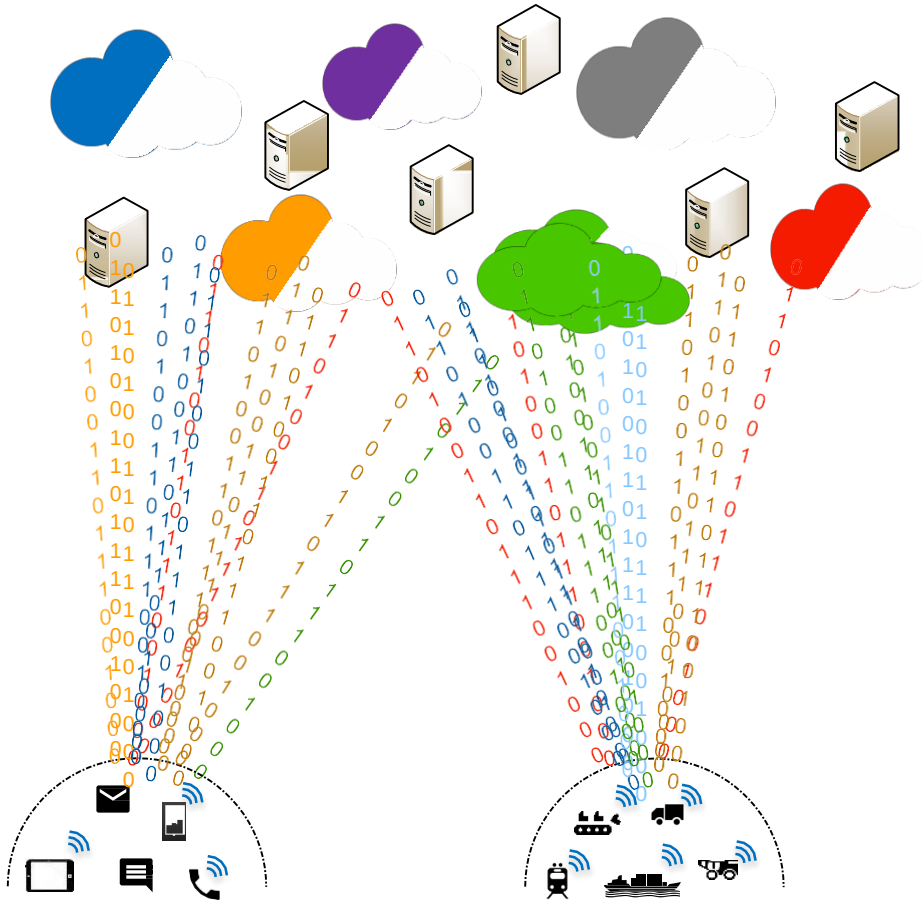
Advantages of Wireless Sensors vs SCADA

- Capital Expense
  - SCADA is ***$30K*** per install
  - Wireless is ***$5k*** per installation
- Deployment Time
  - SCADA takes ***months*** to deploy
    - Requires a shutdown
    - Significant construction
  - Wireless takes ***hours*** to deploy
    - Can be installed on live wires
    - 1 bucket truck and 2 people

The IIoT Challenge



Automation/Control Systems

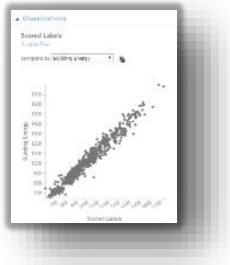


New Sensor Technology

Remote and Mobile Assets

Strategic Approach to an IIoT Enabled Enterprise

Real-time Monitoring



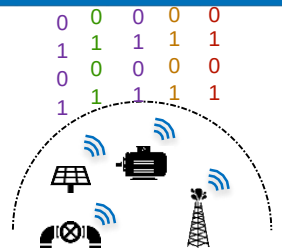
Analytics

Vendor Applications

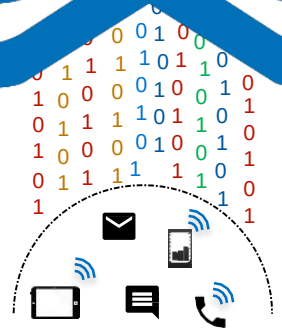
3rd Party Services

OSIsoft.

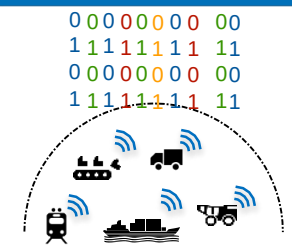
Enterprise Operations Infrastructure



Automation/Control Systems



New Sensor Technology



Remote and Mobile Assets

Data Infrastructure: Designed For Today, and Tomorrow's IIoT

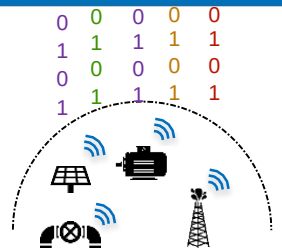
Volume

Variety

Velocity

OSIsoft.

Enterprise Operations Infrastructure



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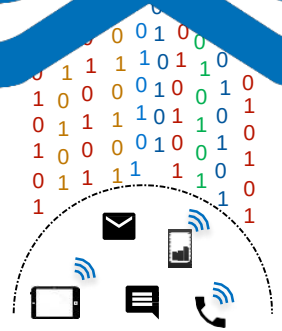
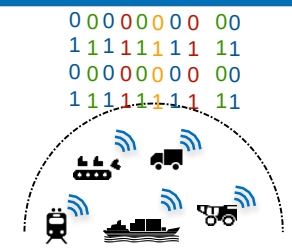


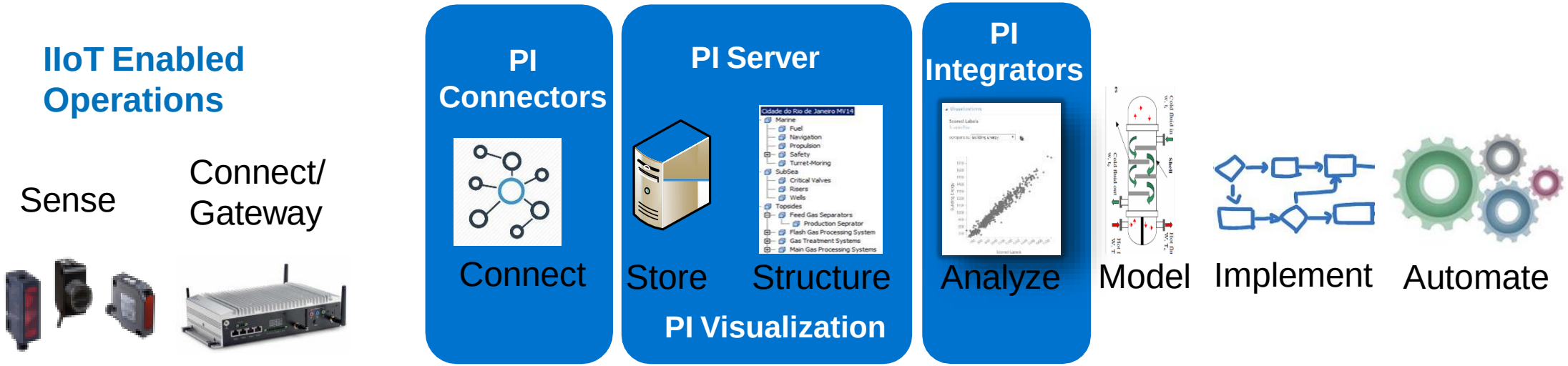
New Sensor Technology



Remote and Mobile Assets

Summary: Steps to Strategically Embracing IIoT …and Achieving Digital Transformation

- **Build a Vision, Strategy and Approach**
- **Educate, Include and Allow**
- **Model, Improve and Automate**

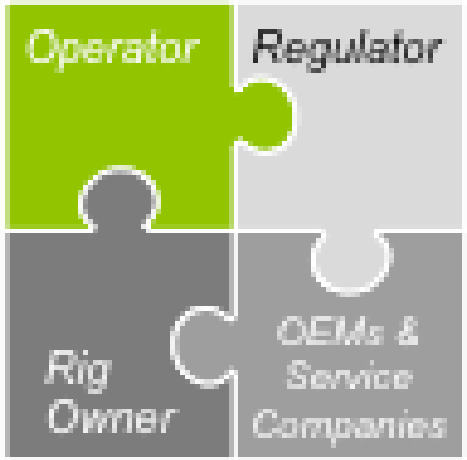


digital competence → digital usage → digital transformation

Conclusions

The Digital Transformation journey has **many business and technical challenges.** A **sound business strategy** along with an **innovative mindset** toward the **enablement of new or enhanced business models should be the driver toward successful execution**.

It is not about data, big data, or IoT platforms. **Data provides no value without a clear business strategy.**



Thank You