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Rockwell Automation + Schlumberger

First fully integrated
Digital Oilfield Automation
solutions provider

Improved efficiency of the digitalization journey in Oil & Gas

London Section IM

8th September, 2020

Thony Brito Cardier – Sr. Digitalization Consultant

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Rockwell Automation + Schlumberger

+ Improved efficiency of the digitalization journey in Oil & Gas

Agenda

1. Brief introduction to Sensia
2. Some challenges of Digitalization
3. Sensia Digital Platform

   Natively integrating information environment with domain applications
4. Demo & Video
5. Q&A

Brief introduction to Sensia

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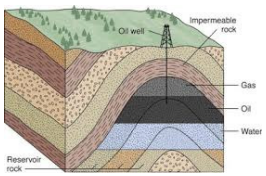
+ Benefits of Digitalization in Oilfields - recap

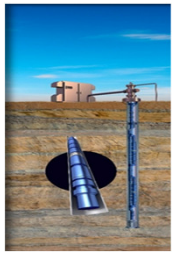
Operational Efficiency
Up to 30% Cost Reductions

Reduction in HSE Exposure



Reservoir recovery increase
Up to 5%

Standardization, Collaboration & Workflows



Production Optimization
3 to 8% Production Increases

Secure Data Environment

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+ Strong Parent Companies

Rockwell Automation

- Founded in 1903
- Founders Dr Stanton Allen and Lynde Bradley pioneers in electronic control technology
- The world's largest company dedicated to industrial automation and information making its customers more productive
- $6.7 Billion (US) FY 2018 Sales
- 23,000 employees serving in more than 80 countries
- Headquartered in Milwaukee, Wisconsin USA

Schlumberger

- Founded in 1926
- Founders Conrad and Marcel Schlumberger pioneers in electrical oilfield logging technology
- The world's leading provider of technology for reservoir characterization, drilling, production, and processing to a global energy industry
- $32.8 Billion (US) FY 2018 Sales
- 100,000 employees serving in more than 120 countries
- Headquartered in Paris, France and Houston, USA

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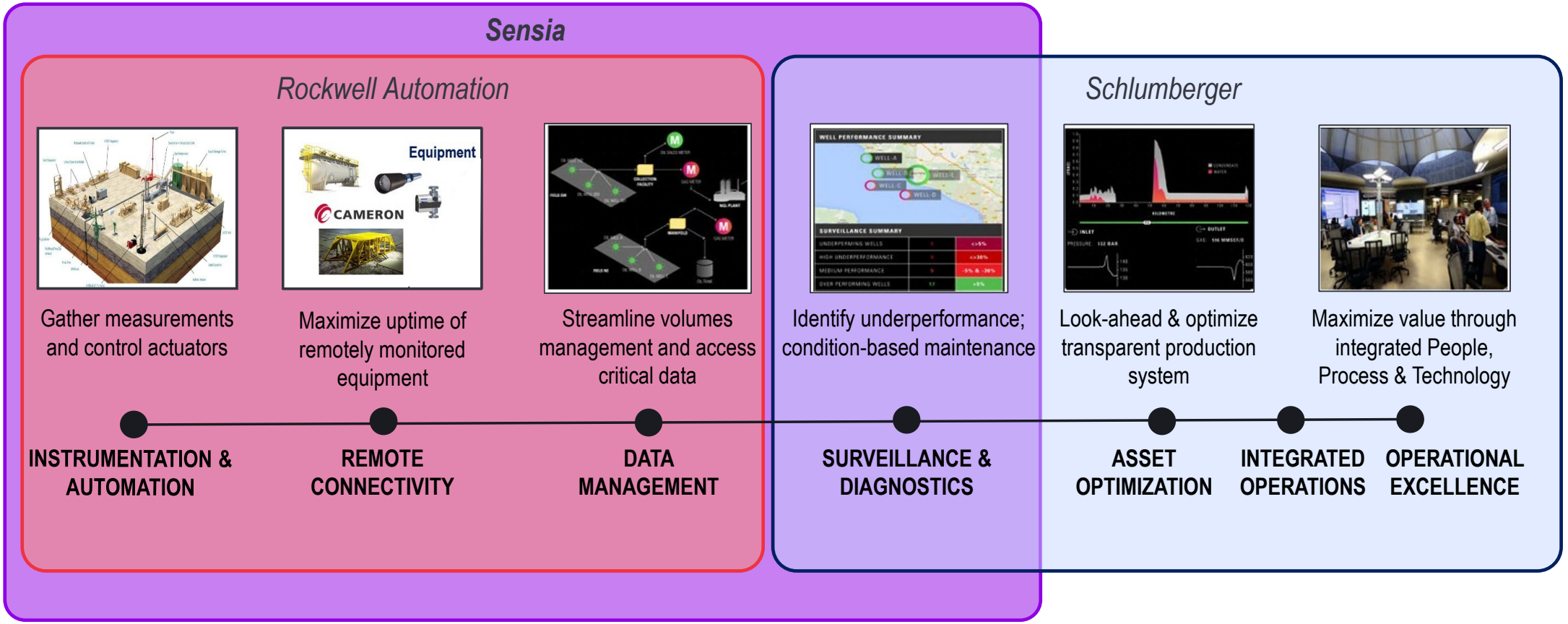
+ Digital Oilfield Value Chain



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Challenges of Digitalization in Oilfields

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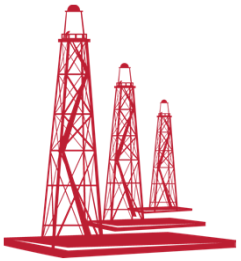
+ Some digitalization challenges

Definition of Vision and Scope, Governance, Change management

Which Technology to implement, Solution design and execution,
Seed Projects vs. Full deployment, Scalability



How to leverage existing investment and Integration, Automated workflows

Data Quality Assurance, Cleansing
20% to 60% of effort wasted

Telecommunication and Network Infrastructure, network security.
Availability and Standards

What Big Data and Analytics to employ?
Model based vs. A.I. Based
Domain Experts & Data Scientists

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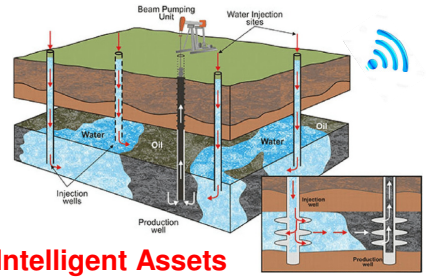
TBC2

+ Sensia Integrated Portfolio

Data

Process Control & Safety



Intelligent Assets

Real-Time Optimisation

Intra-Day Optimisation

Daily Optimisation

Fast Loop

Mid Loop

Slow Loop

ConnectedProduction

VFM
Aggregation
MQTT - Contextualization
Back filling
Self Diagnostics
Edge Applications
Auto Diagnostics
Predictive Analytics

LIFT IQ
AED
Instruct

Avocet

PDMS
Production Data
Well test
Production vs. Forecast
Back Allocation
Orchestration

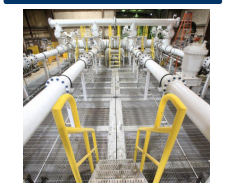
OFM

Production & Reservoir Analytics
Forecasting
Historical Data
Interface to Petrel

Fiscal Measurement

Optimization Solutions

Integrated Packages



Measurement, Metering & Blending

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Slide 10

TBC2 Thony Brito Cardier, 6/29/2020

ConnectedProduction™ Digital Platform

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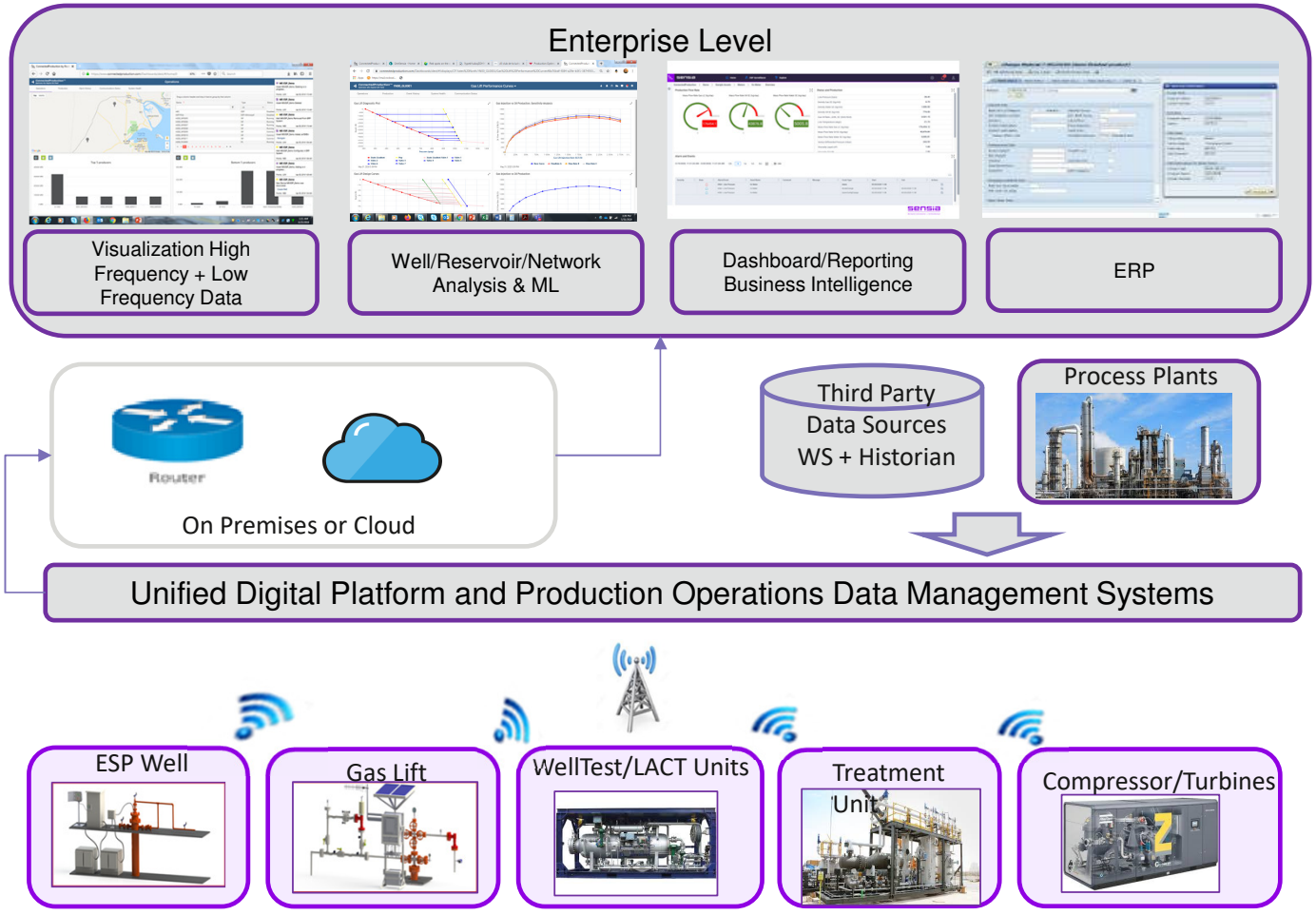
Sensia Digitalization Platform



- **ConnectedProduction™** is a Digitalization Platform
- Applies IIoT technologies to upstream and Midstream Operations
- Combines with Intelligent devices
- Acquires data from devices (legacy and IIoT Enabled) and multiple data sources.
- Data Contextualization
- SCADA Functionality
- Big Data Historian
- On premises or Cloud – Control
- Embedded Advanced Analytics
- Seamless integration with AVOCET/OFM
- Petro-Technical connectors

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- *Custom Analytics Platform & Augmented Reality*

Analytics – Augmented Reality

Rockwell Automation · InnovationSuite powered by PTC

- *Embedded Machine Learning Applications*
- *Link to Petro-Technical Domain Applications*

Advanced Analytics

ESP AI Response Prioritization | Rod Pump / PCP Diagnostics ML | NF Diagnostics ML | Virtual Flow Metering

Petro-Technical Connectors

PIPESIM | Schlumberger | PRODOPS | SYMMETRY | DELFI | 3rd Party

- *Production Operations*
- *Functionality*
- *Connectivity & Control*

Production Operations

Control | Business Workflow | Custom Reporting

Industrial Connectivity

PI Connectors | OPC HDA/UA | Non SQL | SQL

- *Visualization & Dashboards*
- *Big Data Historian*
- *Data Quality & Security*
- *IIoT Gateway & Technologies*
- *Native Connection to Avocet*

ConnectedProduction™ Core

Visualization, Mobile UI

Data Persistence Layer

FactoryTalk Cloud
InfoPlatform, API Gateway, ACL,TLS, Routing

Avocet
Connector

Notification Subsystem | Monitoring Subsystem | Workflow Subsystem | Alarms Subsystem

Live Data Writer | FactoryTalk Cloud | History Data Writer

Secure MQTT – Publish & Subscribe Gateway

- *Data Sources*
- *Hardware / Software*

IIoT Connectivity
kepware

sensia Hardware

CP Gateway

OT Connectivity
InnovationSuite powered by PTC

3rd Party Systems

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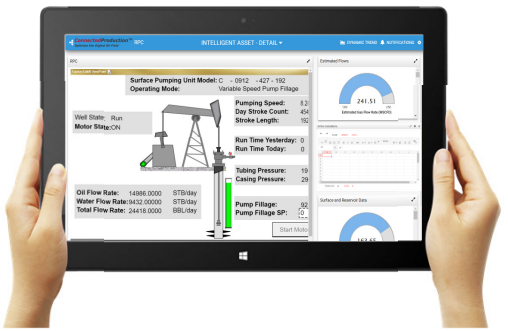
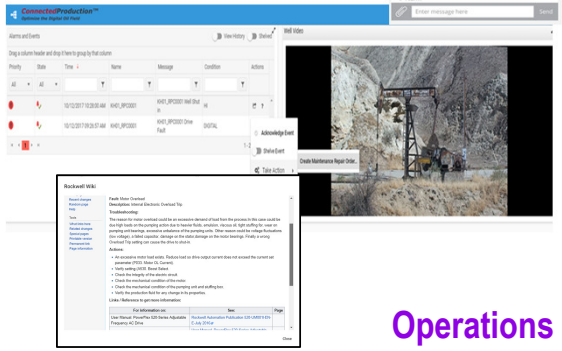
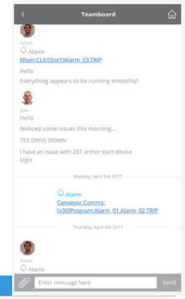
- View top level production roll-up vs target
- View production trends (e.g. up/down vs yesterday)
- Drill down to view issues impacting production

Executive View

- Operations Engineer can view traditional SCADA information (alarms, status, etc.…), mobile enabled
- Same portal also shows analytics, dashboards, reports, etc.…
- Optimized troubleshooting, via workflows, online help

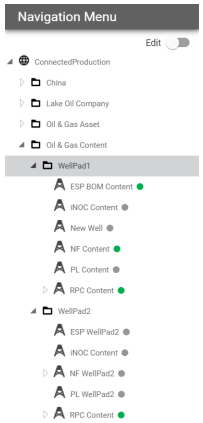






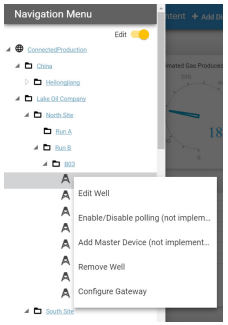
Operations

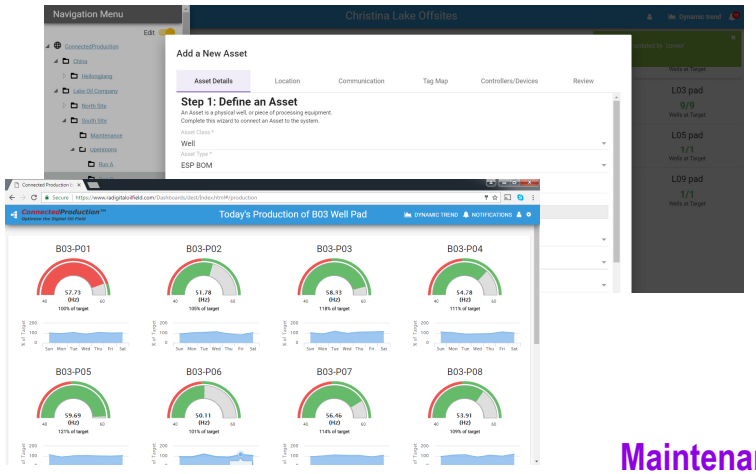
- Production Engineers can look at "out-of-the-box" intelligent asset dashboards, they can also build and share their own dashboards



Production

- Maintenance Engineer can create a folder in their own tree to group similar assets and easily monitor for issues, identify "favorites"





Maintenance

ConnectedProduction™

Enabling Technologies

- Object Modeling and Data Flow Manager
- Messaging Services
- Big Data Historian

Data Gateway and contextualization

RabbitMQ - MQTT

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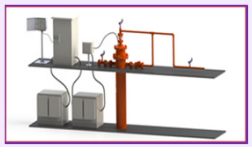
What is an Object/Thing Model in ConnectedProduction™

ESP Well

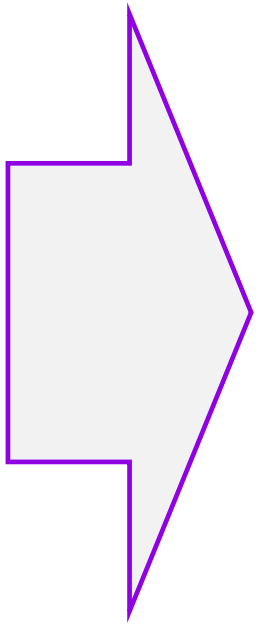


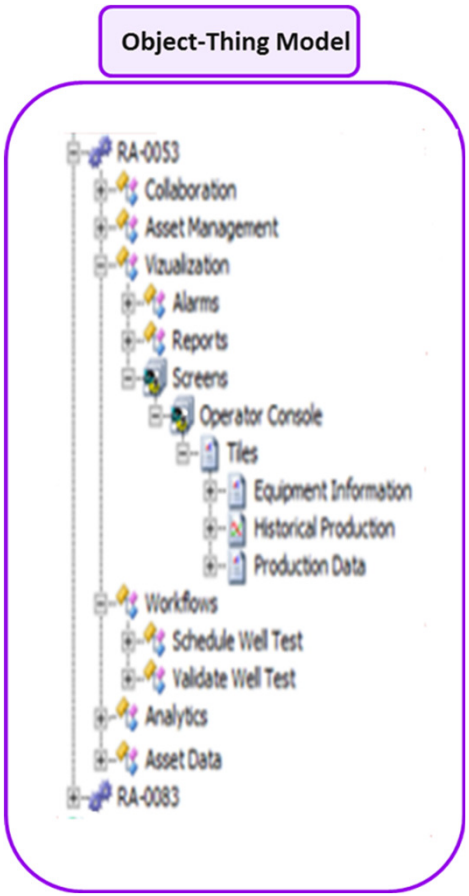
Gas Lift

Well Test Separator

Treatment Unit

Compressor





- Creates an “Object-Thing” Model for each type of equipment in the field (well, skids, facility.).
- System discovers and orchestrates data flow automatically,.
- It is an open architecture that can be used with **multiple applications and suppliers**
- Model inherited to be re-used as many times as required
- **Pre-defined templates libraries**

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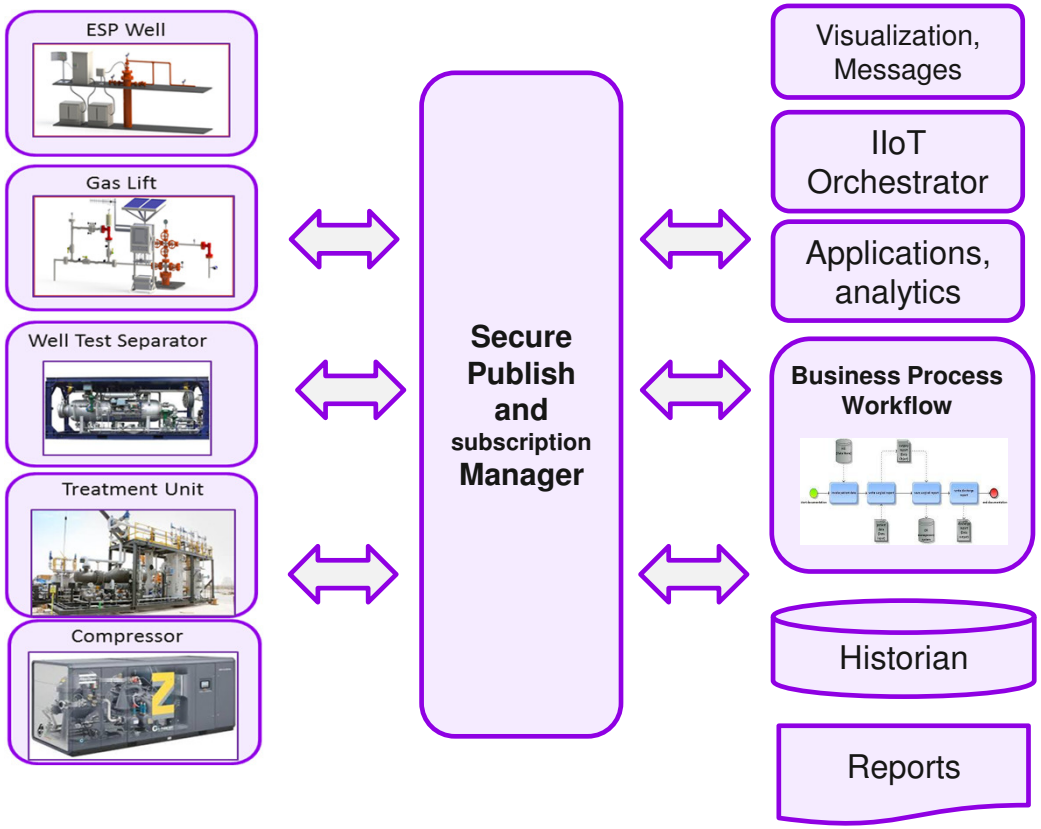
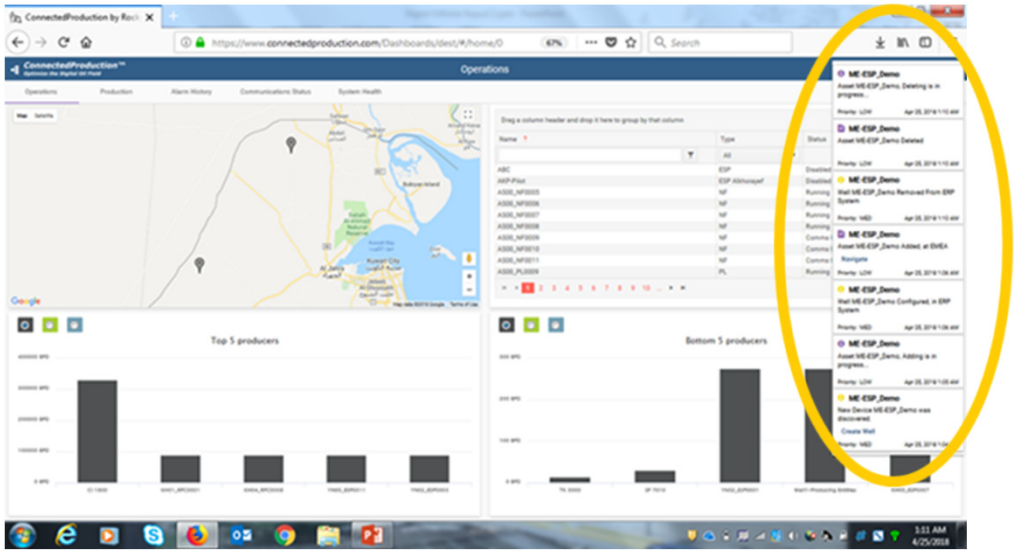
Messaging Services and data contextualization





- Messaging subscription services – MQTT/AMQP
- Generate events and trigger workflow execution
- Enables auto-discovery (plug and play)
- Optimizes telecom network.
- Contextualization
- Automatic Data backfilling

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Big Data Historian

The historian used in ConnectedProduction™ is a massively scalable non-relational database that offers continuous availability, linear scale performance, and easy data distribution across multiple data centers and cloud availability zones.

Advantages:

- **Fast**
  - **Our test results ingress ~42k/s (12x 2000 well system)**
  - **Our test results egress – 550k tags returned in 3 sec**
  - **100 users/20tags/1 month in 2-3 secs avg per user**
- Scalable
  - Add/remove nodes based on need
- **Fault Tolerant**
  - **Multiple nodes**
  - **Replication factor on writes (triplicates)**
  - **Self healing failed nodes**
- Data Center Aware
- Consistency

Source – Information week

http://www.informationweek.com/strategic-cio/why-we-picked-cassandra-for-big-data/a/d-id/1318250

ConnectedProduction™

Advanced Analytics – ML Based

- ESP Surveillance ARP

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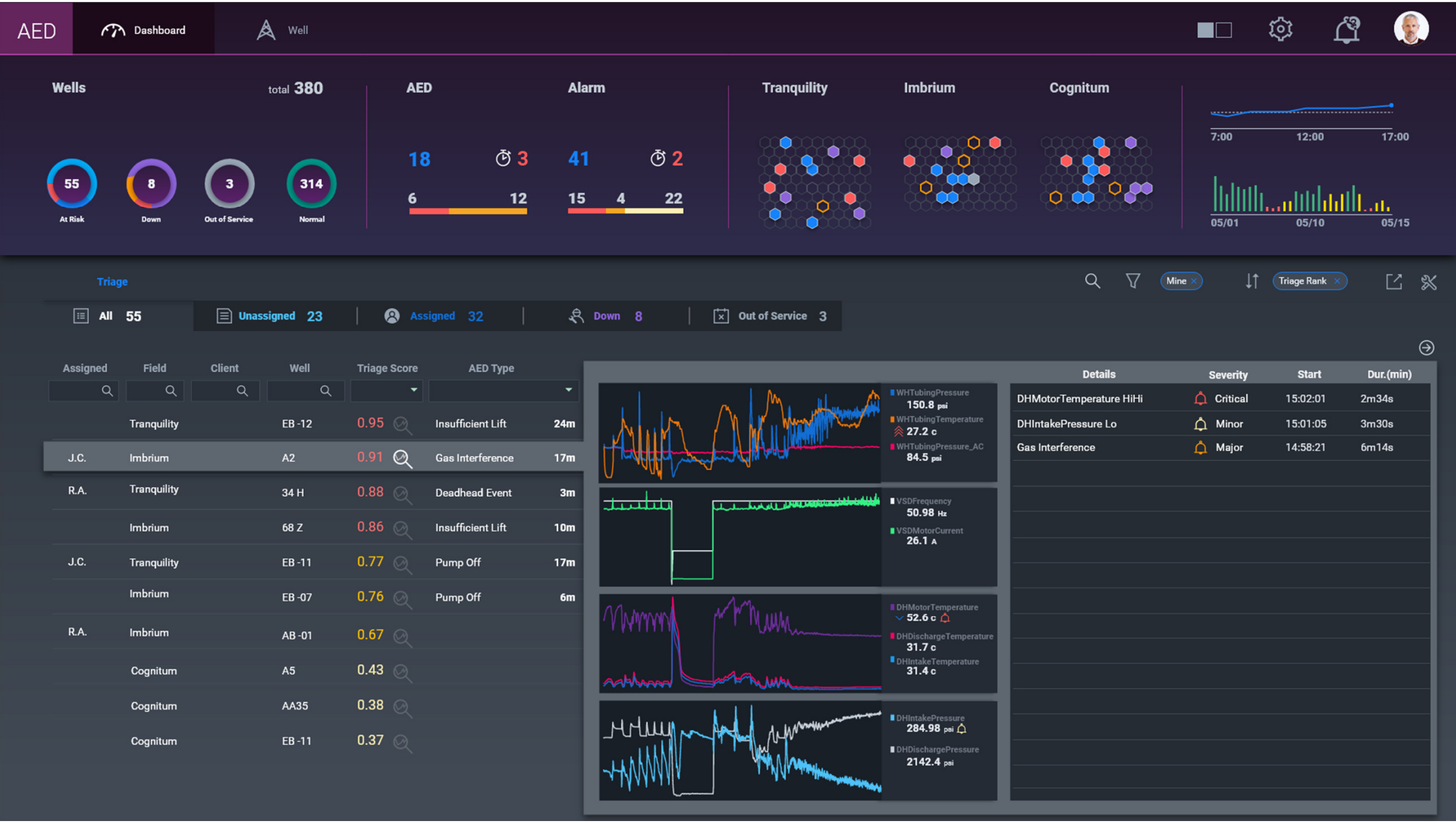
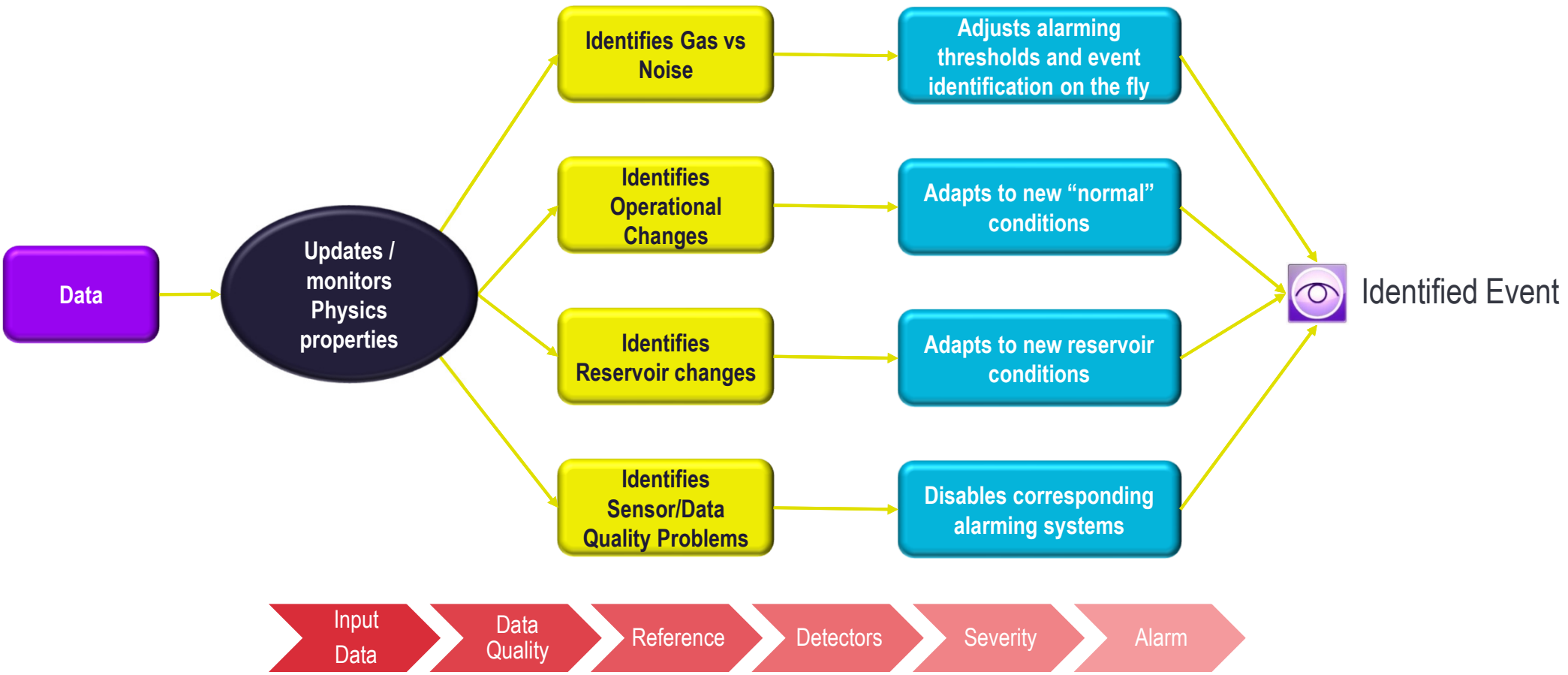

AED
Dashboard
Well
Wells
total 380
55
At Risk
8
Down
3
Out of Service
314
Normal
AED
18
3
6
12
Alarm
41
2
15
4
22
Tranquility
Imbrium
Cognitum
7:00
12:00
17:00
05/01
05/10
05/15
Triage
Mine
Triage Rank
All 55
Unassigned 23
Assigned 32
Down 8
Out of Service 3
Assigned
Field
Client
Well
Triage Score
AED Type
Tranquility EB -12 0.95 Insufficient Lift 24m
J.C. Imbrium A2 0.91 Gas Interference 17m
R.A. Tranquility 34 H 0.88 Deadhead Event 3m
Imbrium 68 Z 0.86 Insufficient Lift 10m
J.C. Tranquility EB -11 0.77 Pump Off 17m
Imbrium EB -07 0.76 Pump Off 6m
R.A. Imbrium AB -01 0.67
Cognitum A5 0.43
Cognitum AA35 0.38
Cognitum EB -11 0.37
WHTubingPressure 150.8 psi
WHTubingTemperature 27.2 c
WHTubingPressure_AC 84.5 psi
VSDFrequency 50.98 Hz
VSDMotorCurrent 26.1 A
DHMotorTemperature 52.6 c
DHDischargeTemperature 31.7 c
DHIntakeTemperature 31.4 c
DHIntakePressure 284.98 psi
DHDischargePressure 2142.4 psi
Details
Severity
Start
Dur.(min)
DHMotorTemperature HiHi Critical 15:02:01 2m34s
DHIntakePressure Lo Minor 15:01:05 3m30s
Gas Interference Major 14:58:21 6m14s

How Does It Work?



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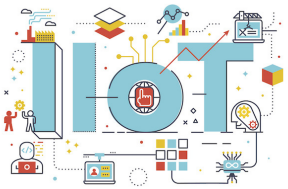
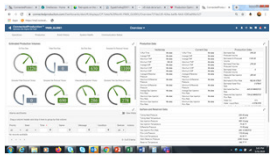
+ Advantages of ConnectedProduction™ Digital Platform

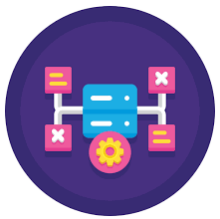
Fast deployment



IIoT Technologies and Open protocols Ethernet/IP - MQTT



Rich visualization in HTML5 UI (No add-ons needed

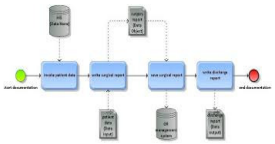


Highly Available Fault Tolerant Historian

Avocet

Alarms and configurable events, integrated with Avocet Production Operations Management Software

Encrypted Secure Architecture Secure Cloud Environment



Triggers workflows direct from events and notifications

Mobility enabled from Core platform

Enables control from same platform – Unmanned Operations / On - Demand

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- Demo & Video

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+ Thank You

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