Operational Excellence

Digital Initiatives

Business Insights

Building Sustainable Digital Enterprises

greenojo
smart n sustainable solutions

Energy | Utilities | Sustainability | Manufacturing | Healthcare | Finance

About Us

Greenojo is a technology consulting firm focused on building smart and sustainable solutions for industry 4.0+ in select industries leveraging emerging technologies such as <u>Artificial Intelligence, Blockchain, Cybersecurity, Digital Twins and IoT/ IIOT/Edge</u>

30+ Industry Solutions | 20+ Frameworks | 200+ Man Years of Leadership Experience

Our Startup Support Partners

startup.focus.   IBM.   10 000 START-UPS
IBM Global Entrepreneur   A NASSCOM initiative

Our Technology Partners

SAP   IBM   Microsoft   G   aws

Digital Initiatives
- Plant Safety
- Asset Reliability
- Process Automation

Operational Excellence
- Real-Time KPI Dashboards
- Asset Failure Prediction
- Remote/Connected Plants

Business Insights
- Predictive Operations
- Asset Performance Analytics
- Operational Performance Metrics

AI-ML Use Cases

1 Operations Integrity
(IoT)

2 Predictive Operations
(Predicted Models)

3 Production Forecasting
(What-If Models)
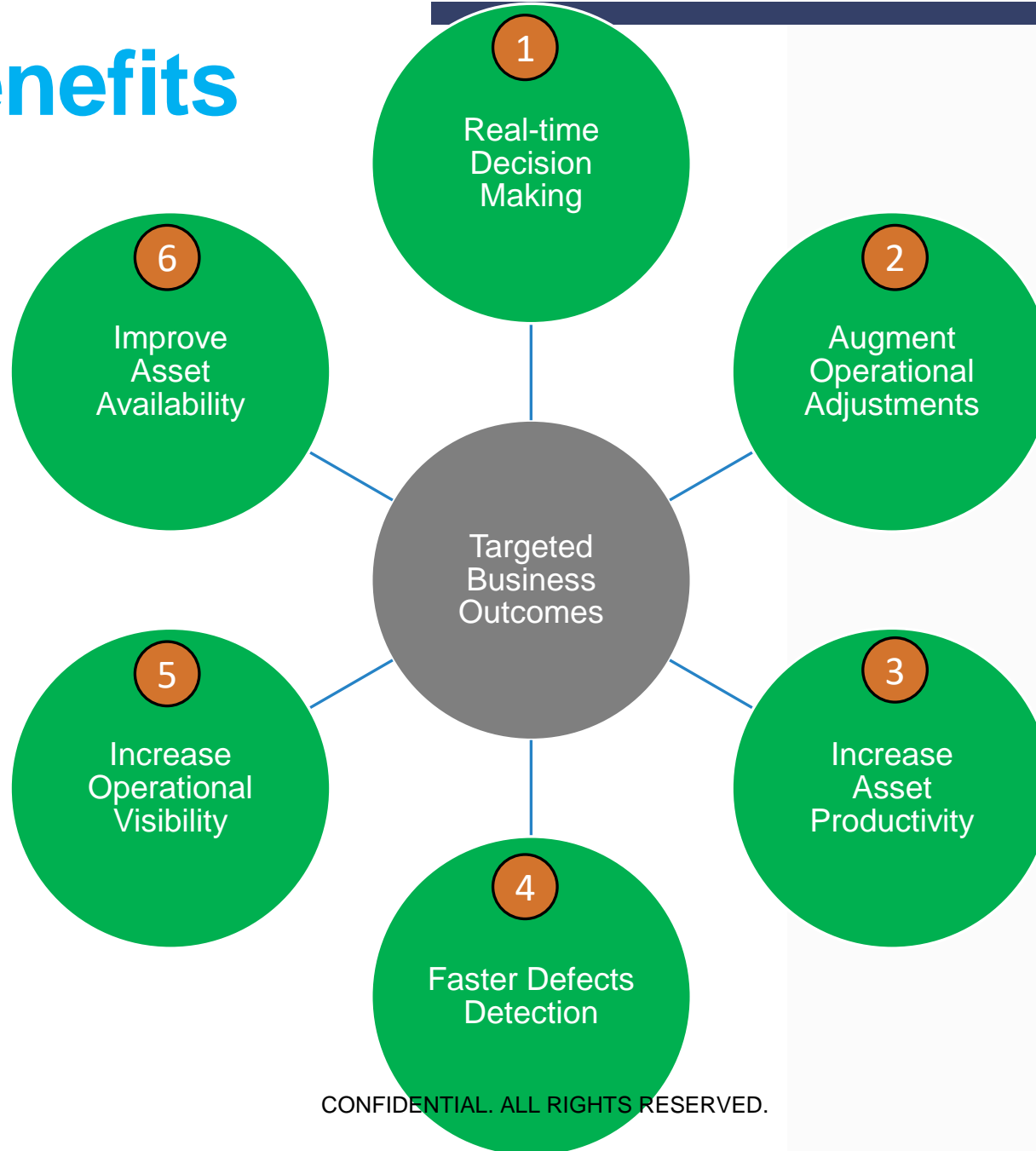
4 Defects Detection
(Deep Learning)

5 Operational Logs Analytics
(Simulation)

6 Asset Performance
(Failure Analytics)

Business Benefits

Targeted Business Outcomes

1. Real-time Decision Making
2. Augment Operational Adjustments
3. Increase Asset Productivity
4. Faster Defects Detection
5. Increase Operational Visibility
6. Improve Asset Availability

AI-ML Use Cases

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Operations Integrity

Business Challenges ⚠

- Remote visibility and monitoring to measure and control well parameters, specifically, mud properties, pump pressure, casing pressure and gains & losses is critical

- Managing voluminous data visualization and data integration with G&G and drilling systems is a challenge

- Requirement of analytics at the edge or at a local network for sub-surface drilling operation

Business Objective ◎

- Support a flexible implementation framework to perform advanced drilling data analytics

- System should help to perform 2D/3D visualizations & analytics to understand current down hole conditions through valuable insights rather than raw data as needed for effective collaboration

- System should allow real-time, micro-batch as well batch wise visualization as well as analytics – from a time + depth perspective

Solution 💡

- Enables real-time visibility through a driller's dashboard

- Provides real-time 2D/3D visualization

- Enables visibility to real-time measurement of well parameters, such as mud properties, pump pressure, casing pressure and gains & losses

- Ability to visualize and predict current or possible NPT conditions

- Ability to predict lithology and export trained models as a service

Business Value 📈

- Real time data usage for drilling decisions

- Better Data QC & improving the quality of real time data through seamless data sharing

- Better operational collaboration in operations related to drilling, well planning, design & construction

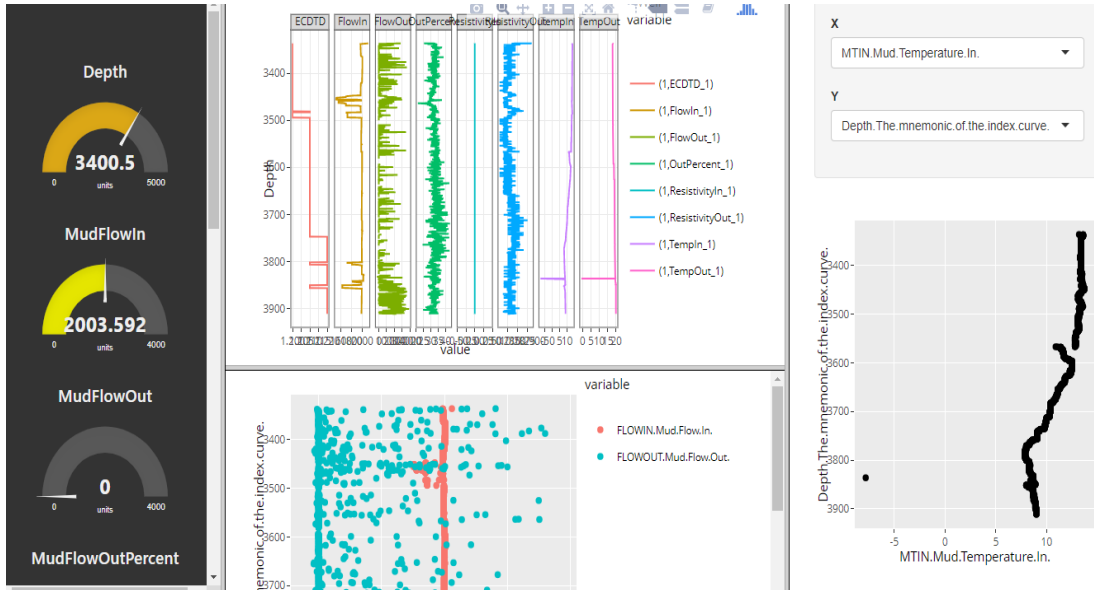- Increased efficiencies in drilling data analytics, e.g., 20+% improvements in Drilling NPT

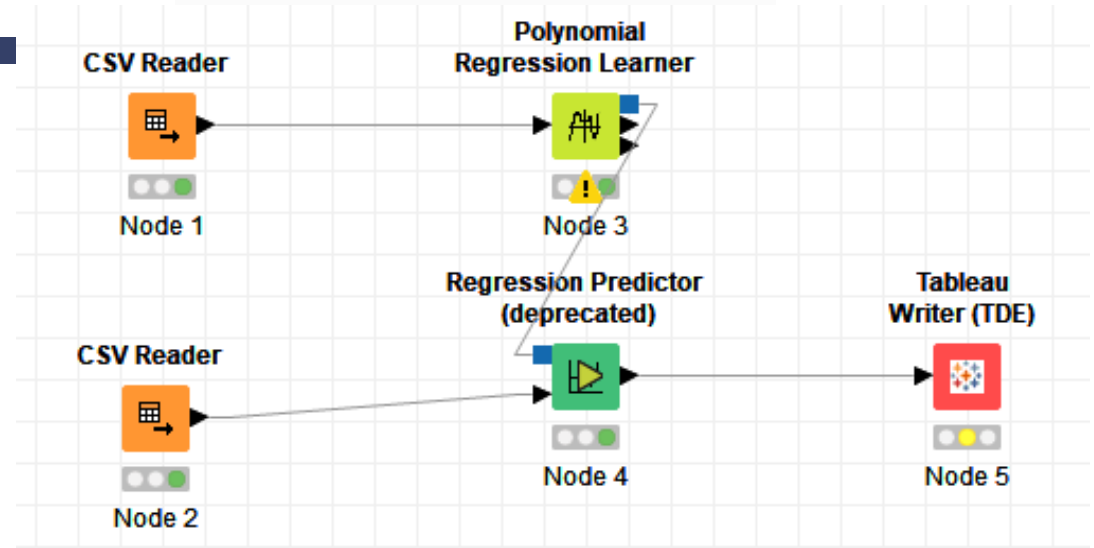# Drilling Operations Insights
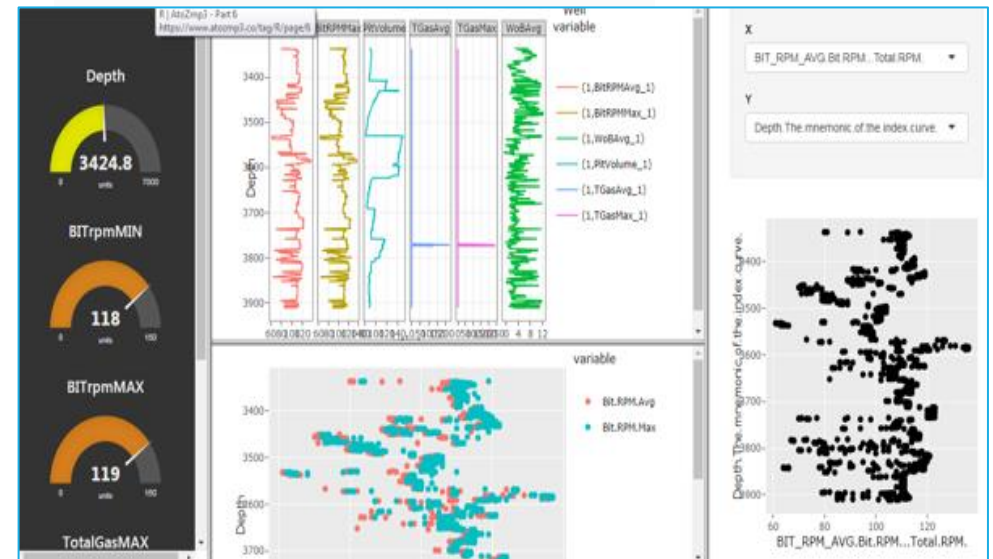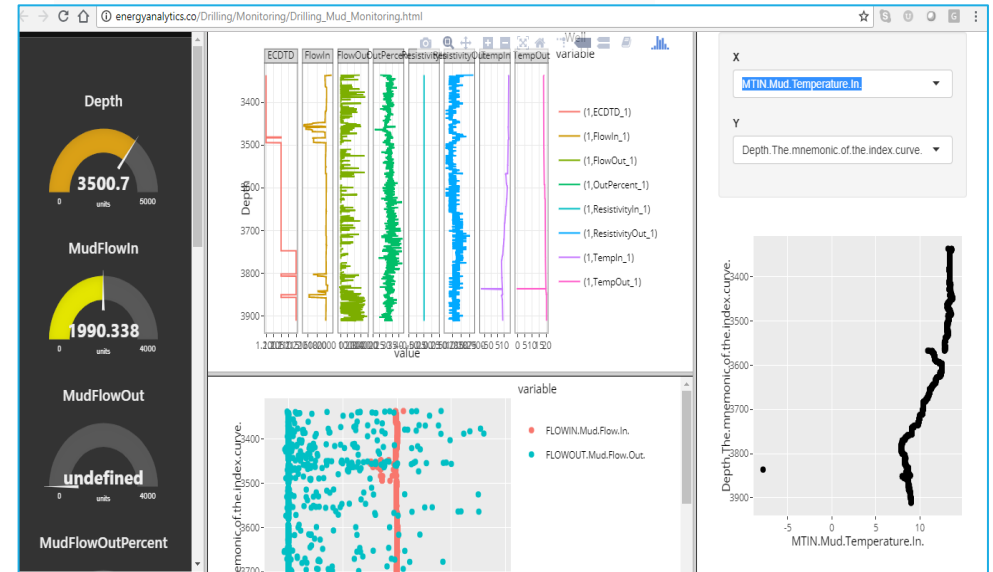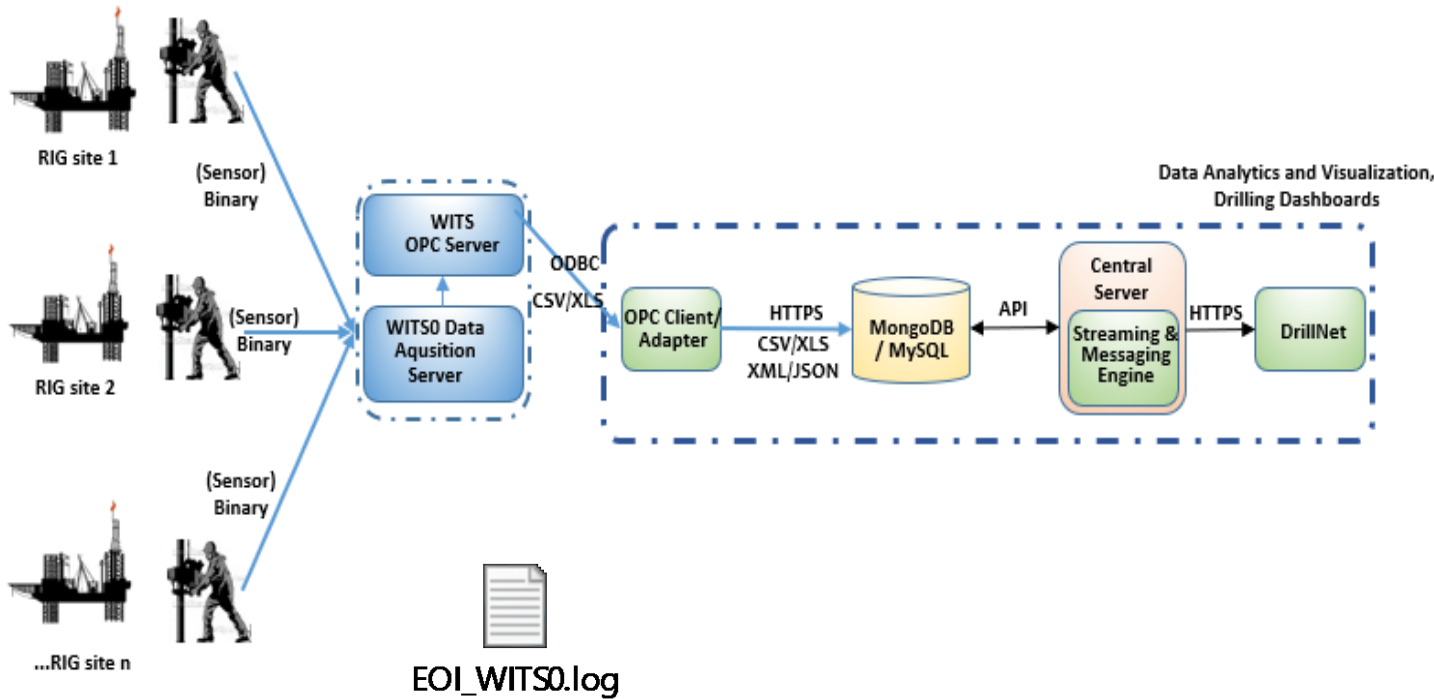
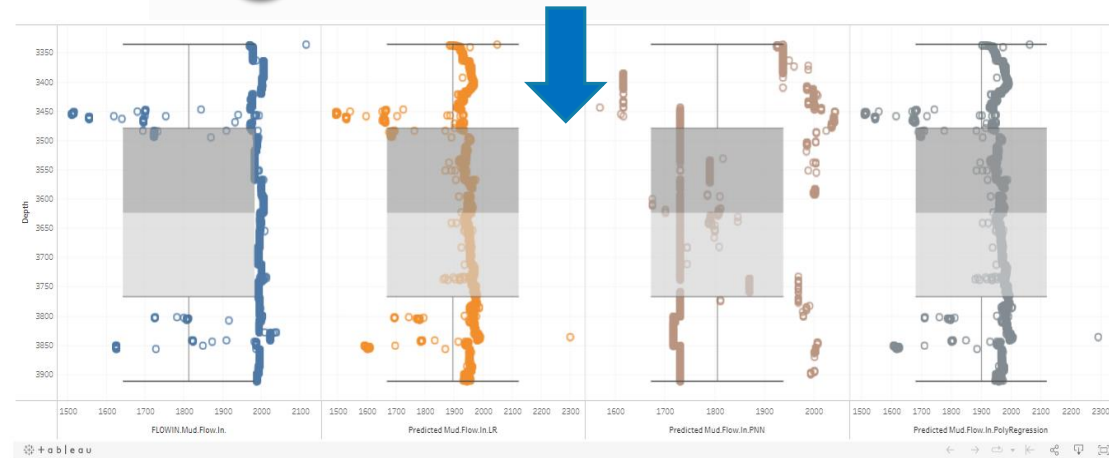# Drilling Operations Insights
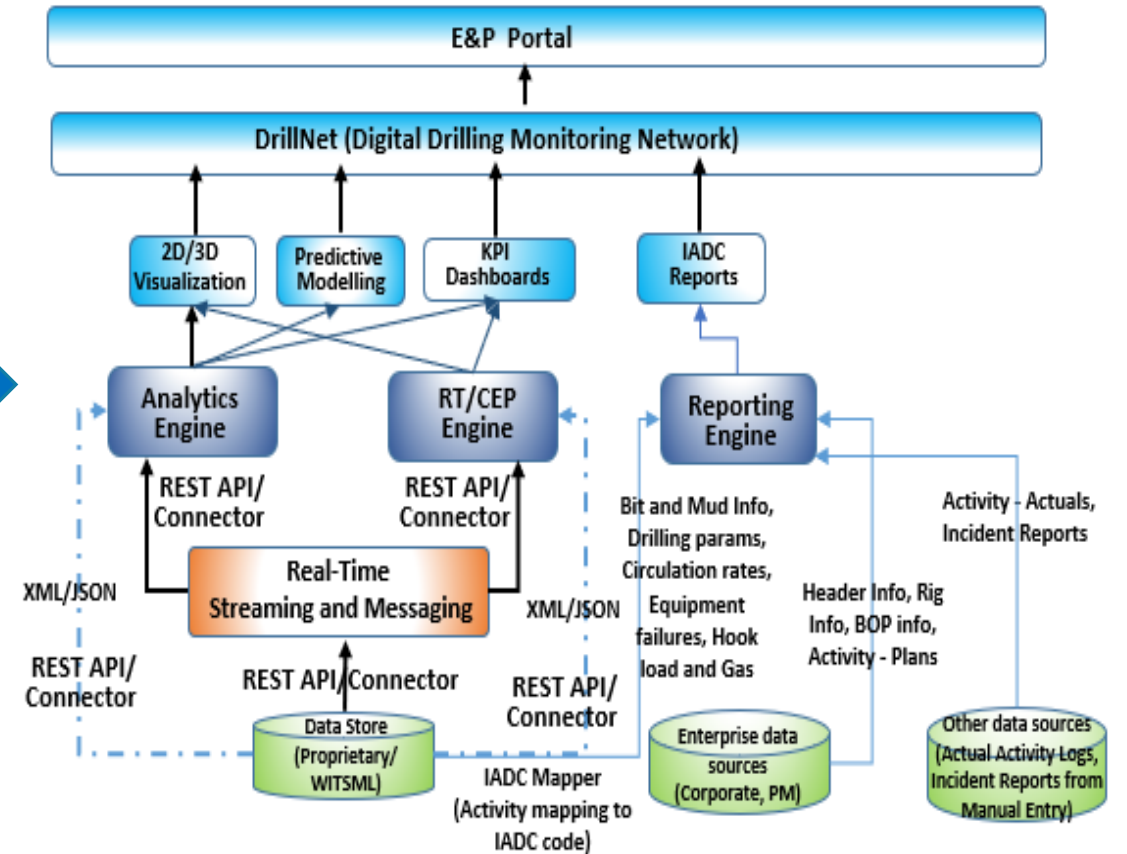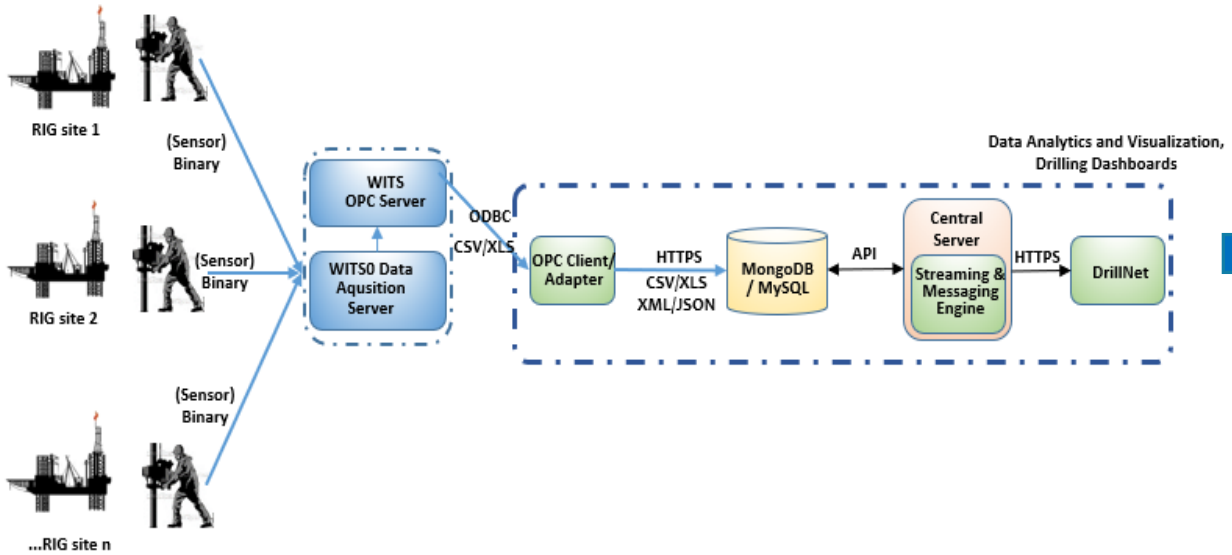
Drilling Operations Insights

OT/ Drilling Data – Variance Analysis for Well Integrity – Mud Flow In/Mud Flow Out

(1) **IOT HUB (IBM Watson)**

Predicted Models - Mud Flow In/Mud Flow Out

(2) **AI-ML Workbench (KNIME)**

Predicted Output - Mud Flow In/Mud Flow Out

(3) **BI Tool (Tableau)**

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AI-ML Use Cases

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Predictive Operations

Business Challenges ⚠

- Non-productive time (NPT) is the actual time (in man hrs) when drilling operations do not occur

- NPT accounts for 20% - 30% of the total drilling operations costs and NPT due to "waiting" factor

- Significant waiting delays (in days) for data relays from the drilling and logging sites to the Rig Automation/ Analytics Center and vice versa

Business Objective ◎

- Adopt On-demand, predictive and agile data-to-insights (d2i) platform

- Solution should enable combined data-to-insights process (d2i) to manage both structured and unstructured data sources

- Platform should allow instant analysis to identify lithology patterns, hydrocarbon zones or deviations in the sub-surface zones

Solution 💡

- Uses prediction models for sub-surface characteristics, drilling plans, production, etc.

- Supports application of AI/ML algorithms for NPT reduction strategies and lithology prediction

- Monitors events to avoid drilling surprises/incidents

- Uses prediction and forecasting models for sub-surface characteristics, drilling plans, production, etc.
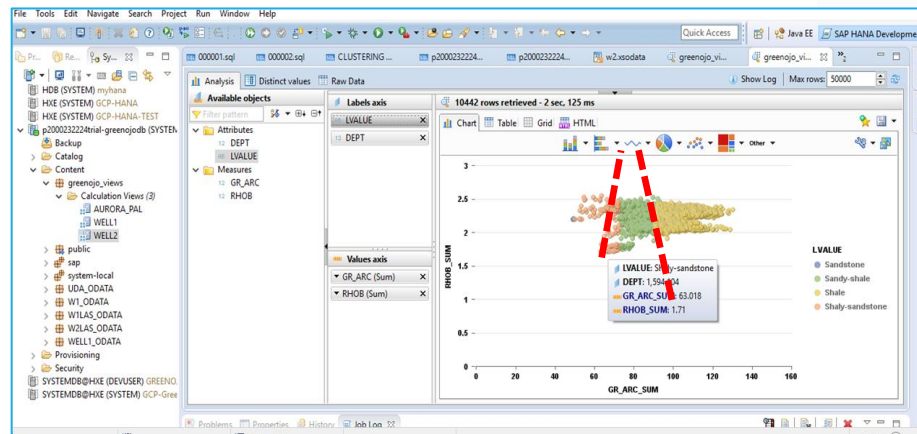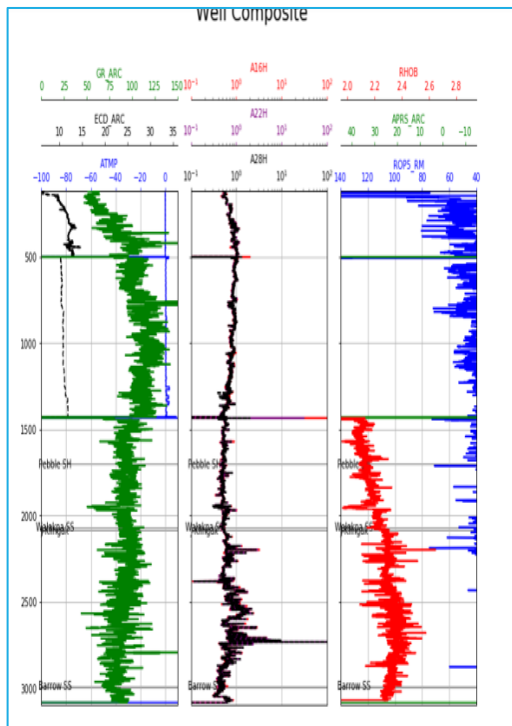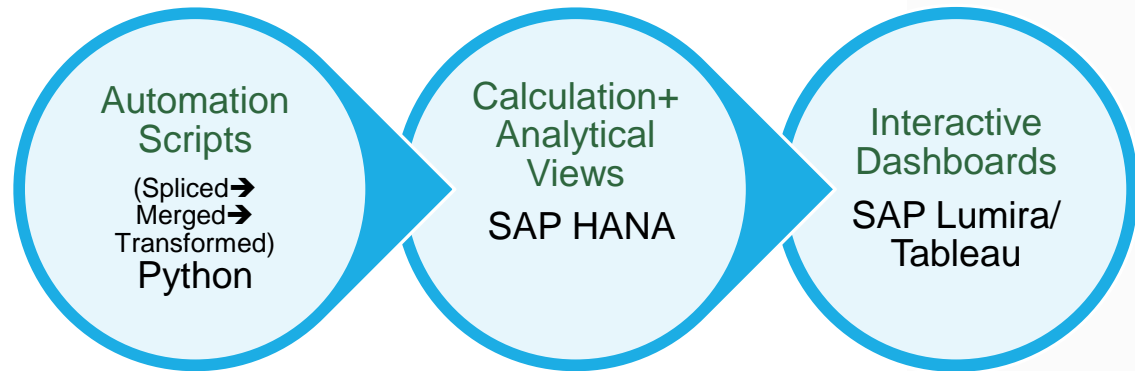
Business Value 📈

- Solution can be plugged in as part of Digital Oil Field (DOF) strategy for an upstream oil & gas firm

- Solution leads up to reduction of NPT (nonproductive time) factor "waiting time" by 20%+

- Customers can analyze several terabytes of data from multiple E&P data clusters instantly

Lithology Prediction

Lithology Prediction

Automation Scripts (Spliced➔ Merged➔ Transformed) Python

Calculation+ Analytical Views SAP HANA

Interactive Dashboards SAP Lumira/ Tableau
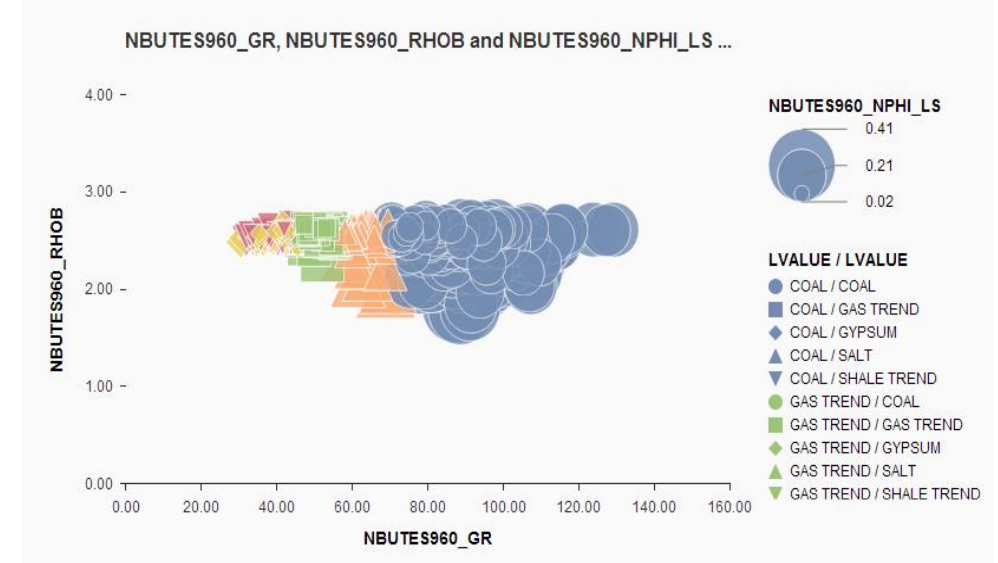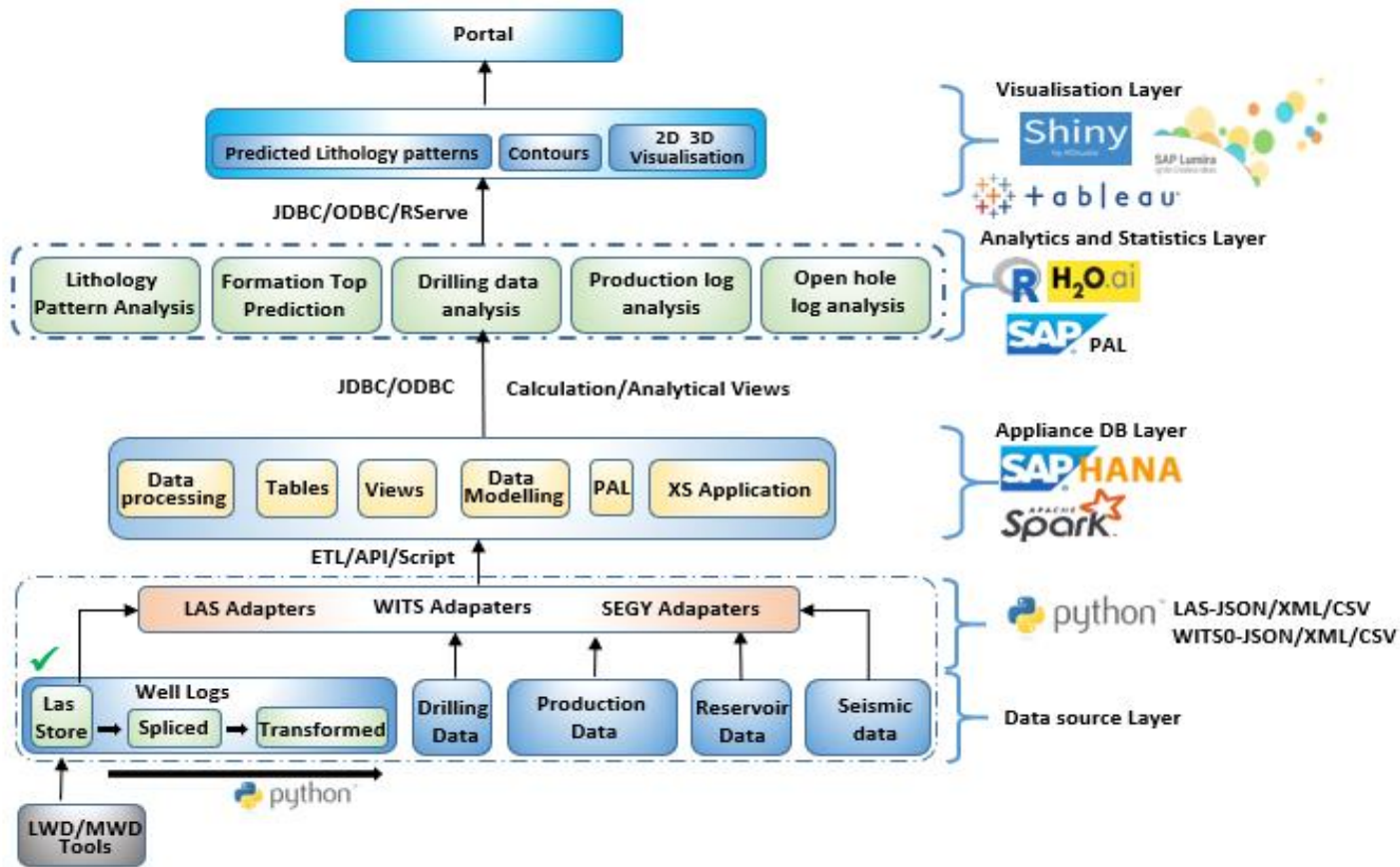
1 **Automation Scripts**

2 **SAP HANA Analytical Views**

3 **BI Tool (Tableau)**

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Production Forecasting

Business Challenges ⚠

- Accurate forecasting of oil production rate in petroleum wells

- Limited to time series and based on heuristics and statistics

- Existing regression models are biased and less scalable

Business Objective

- Support a flexible implementation framework to perform advanced production data forecasting

- System should help to perform on-demand visualizations and analytics to understand production conditions and update based on what-if scenarios

- System should include neural network models for close-fit predictions

Solution 💡

- Solution addresses the need for real-time dashboards for crude oil production forecasting using machine learning & deep learning models

- Handles real-time production data for forecast modelling

- Includes open API based adapters, analytical views, automation scripts & dynamic dashboards
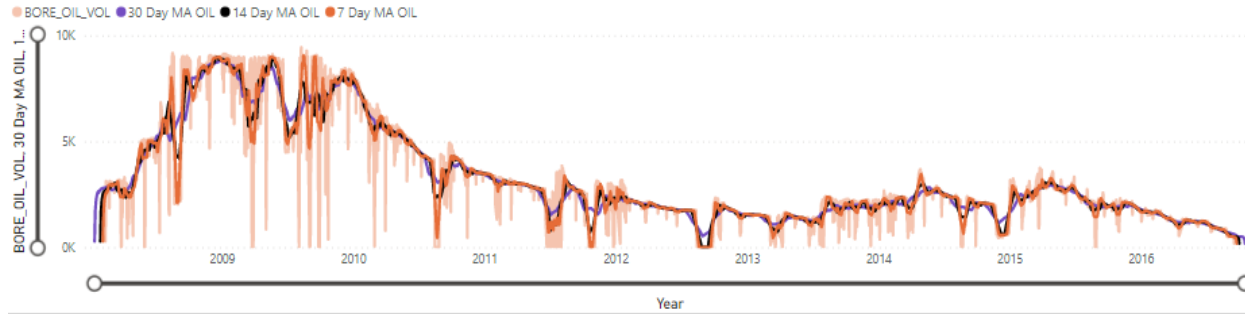
Business Value 📈

- Real time production performance KPI dashboards

- On-demand reports to summarize trends/outliers for liquid rate, pressure, gas-oil ratio, water cut, water injected, etc.

- Enables visibility to asset performance, prediction of production declines & production optimization (flow rate forecasting)
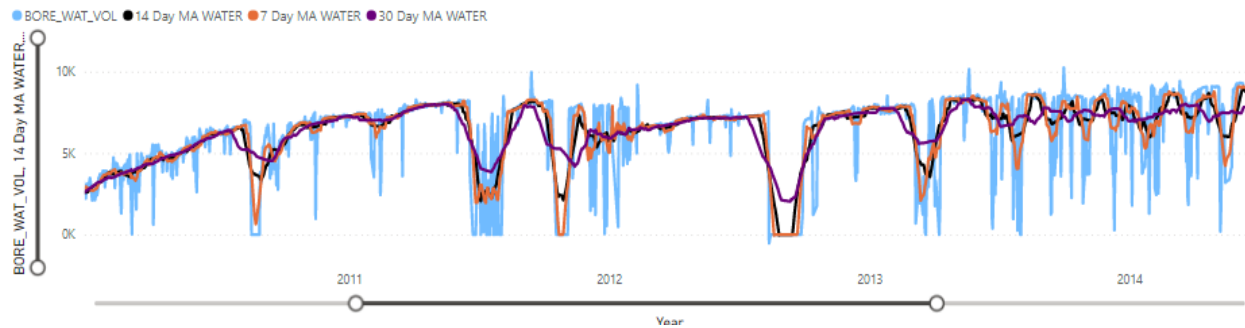
Production Forecasting

Production Forecasting

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Defects Detection

Business Challenges ⚠️

- Accurate predict defects on steel sheets and visually localize the defect

- Existing models are biased and less scalable. Requirement of deep learning models for faster interpretations, as well support to perform what-if models

- In case a default is detected, solution should also showcase the detected defaults on the image itself

Business Objective

- Support a flexible implementation framework to perform advanced outlier detection

- System should help to perform on-demand visualizations and analytics to understand defects

- System should include neural network models for close-fit predictions

Solution 💡

- Solution is built using an open-source computer vision platform to perform remote inspections and detect deviation from specifications (as defects) during production

- Defects detection using CNN (Convolution Neural Networks). Also, this solution leverages transfer learning using pretrained ResNet50 model

- Solution generates a pixel-wise prediction to localize the defect on the image using a Res-U-net architecture
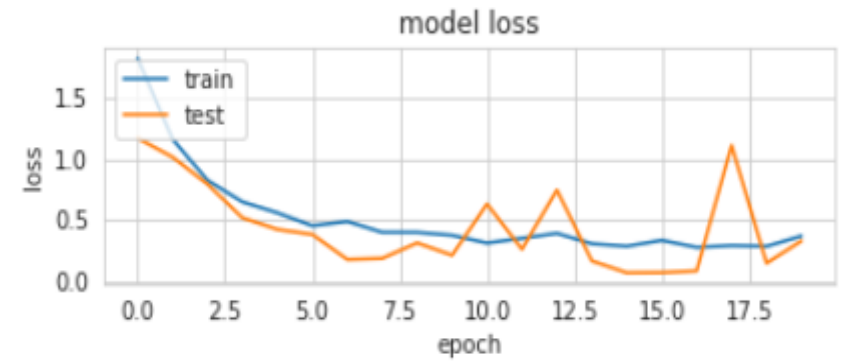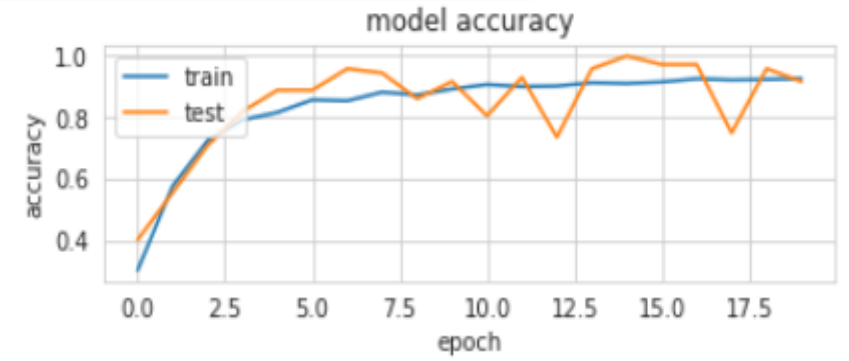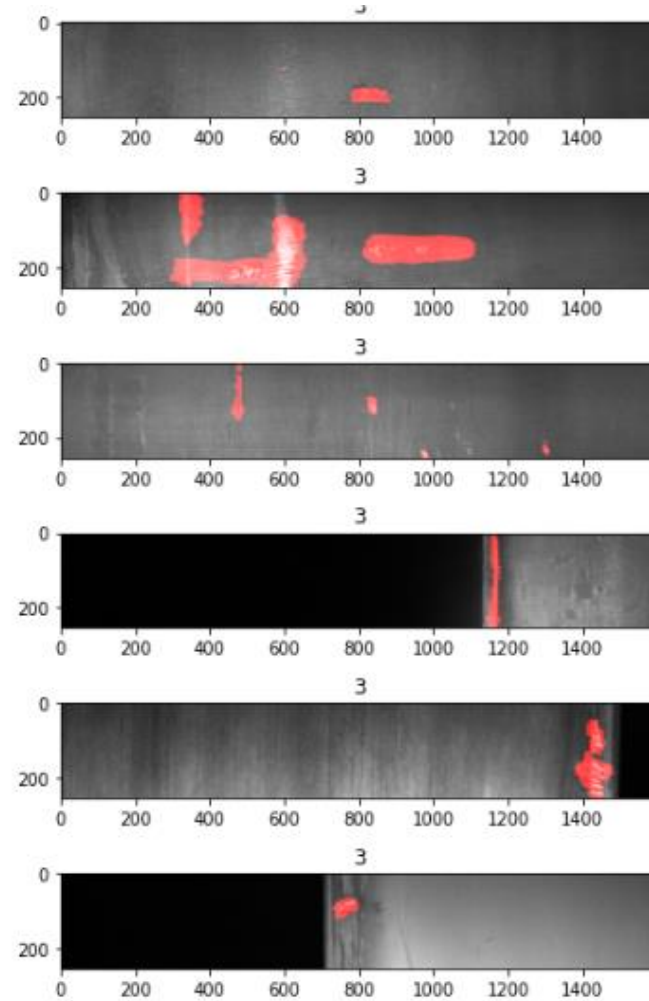
Business Value 📈

- Solution shows the exact position of the detected defaults on the image (image segmentation)

- App-based streaming on inspected items is shared in real-time to the QC team at production site

- Solution also supports for 3D and AR (Augmented Reality) models

Defects Detection
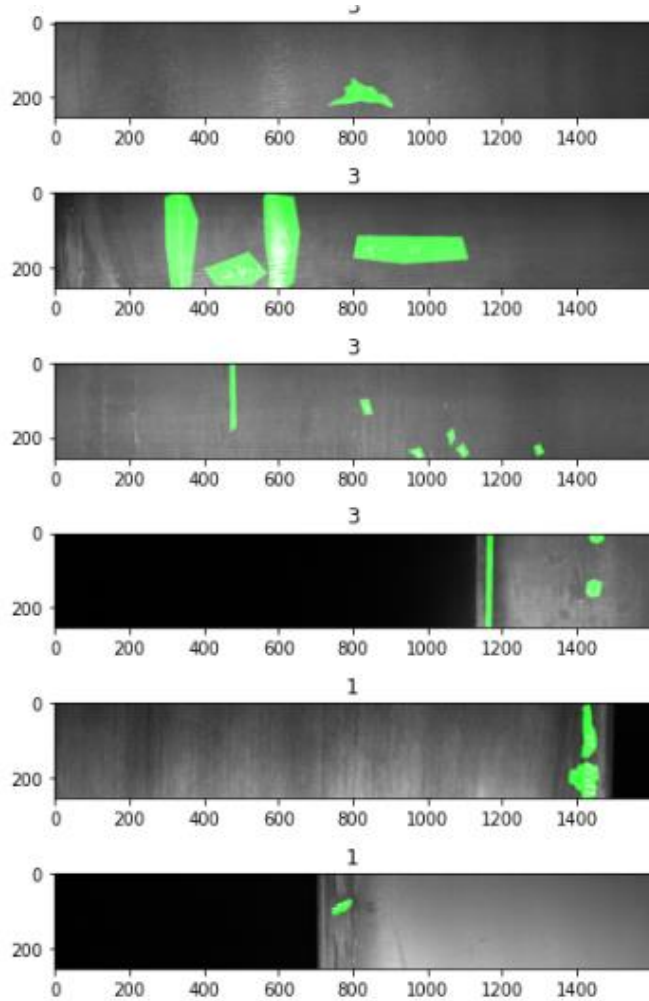
Actuals   Predicted

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Operational Logs Analytics

Business Challenges ⚠️

- Lack of a single platform that enables E&P data and logs analysis from multiple logs spread across structured as well as unstructured data sets

- Constraints in implementation of an integrated framework to perform advanced 2D/3D visualization as well as AI/ML based model predictions across E&P logs from various operations

Business Objective ◎

- Adopt On-demand, predictive and a ready implementation framework

- The architecture should allow to perform advanced 2D/3D visualization as well as AI/ML based model predictions

- Platform should support application of AI/ML algorithms for forecasting and prediction of operational interventions

Solution 💡

- Automation Scripts for Routine tasks like Splicing, Merging, Data Transformation

- Supports in splicing and merging of LAS files. eases measurement and control of sub-surface parameters (relates to well log, drilling, production, reservoir)

- Manages to perform 2D/3D visualizations and generate specific domain models to understand ground conditions

Business Value 📈

- On-demand/ 24*7 real-time/batch mode availability for multiple logs visualization as well interpretation by G&G team

- In-built AI/ML algorithms as a service for prediction modelling on logs in their native formats

- Get the solution plugged in as part of Digital Oil Field (DOF) strategy of the firm

Operational Logs Analytics

E&P Logs Analyzer - Reservoir Drainage
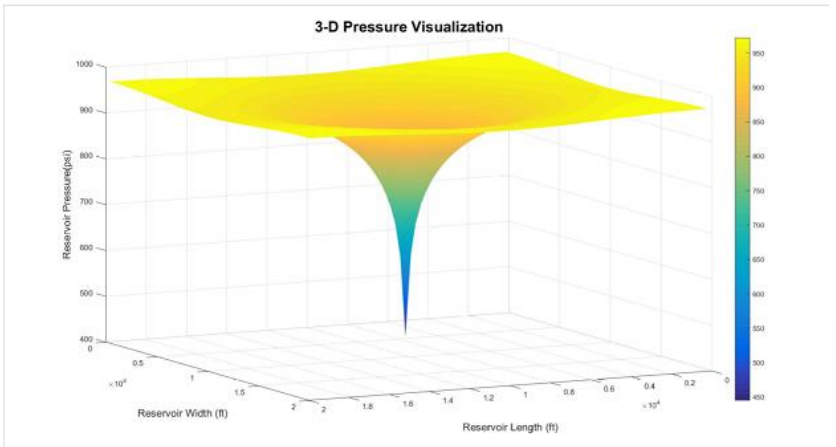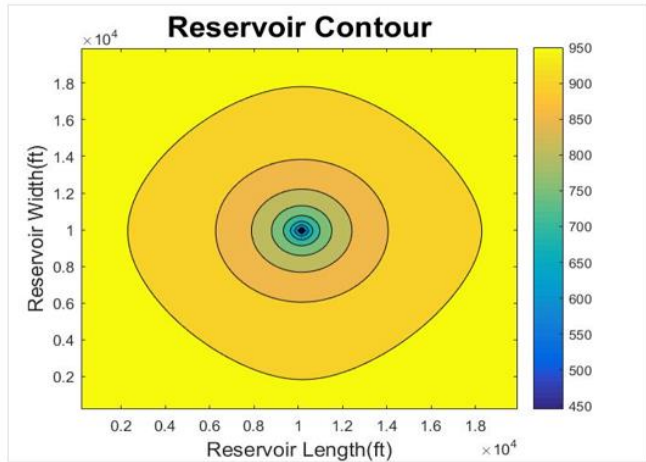
E&P Logs Analyzer - Reservoir Models
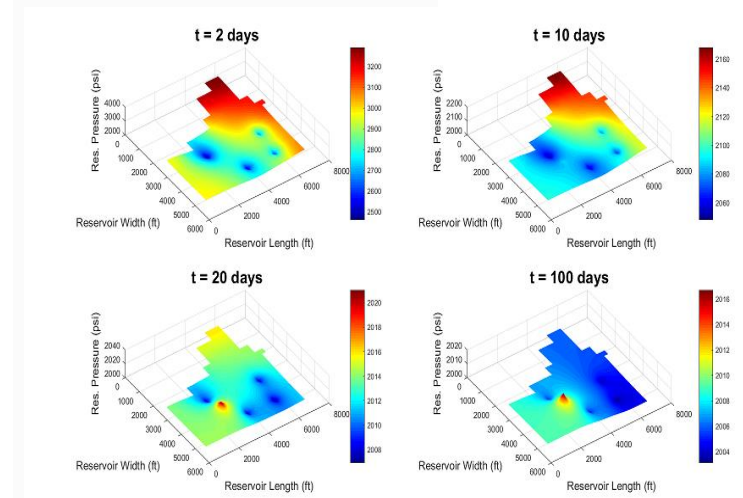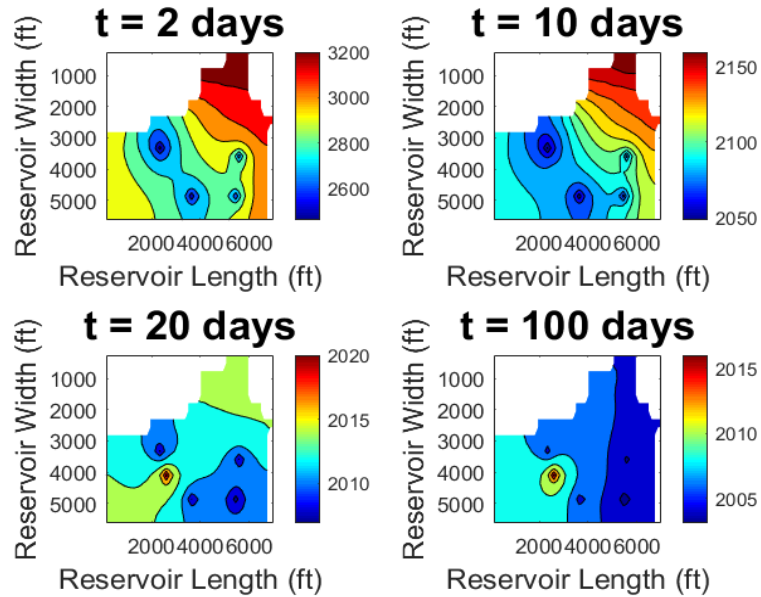
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Asset Performance

Business Challenges ⚠

- Failures in production linked assets such as Electrical Submersible Pumps (ESPs) can disrupt production and operator cash flows

- Costs of replacing an ESP and its associated production losses can be enormous

- If failures could be predicted with enough advance notice, then the ESP can be pulled during scheduled maintenance

Business Objective ◎

- Risk of ESP failures can be greatly reduced by AI/ML combined with IoT enabled surveillance system

- Operators need an early-warning system of ESP performance degradation in the form of a probabilistic and predictive maintenance model

- Solution should support What-If, Reliability Analysis, Mean Time to Failure (MTTF) Prediction, Failure Distribution

Solution 💡

- Solution using an analytics workbench for asset performance analysis specific to asset health insights

- Identifies fault behavior using pattern recognition

- Generates Asset Health prediction reports at regular intervals

- Accurately predicts future failures using predictive analytics on a real-time series of data

Business Value 📈

- Operators get more insight on the root causes of performance anomalies as well as how to mitigate and manage them until the well's next planned shutdown

- Improved ESP uptime and availability resulted in the reservoir's ultimate profitability

Asset Performance
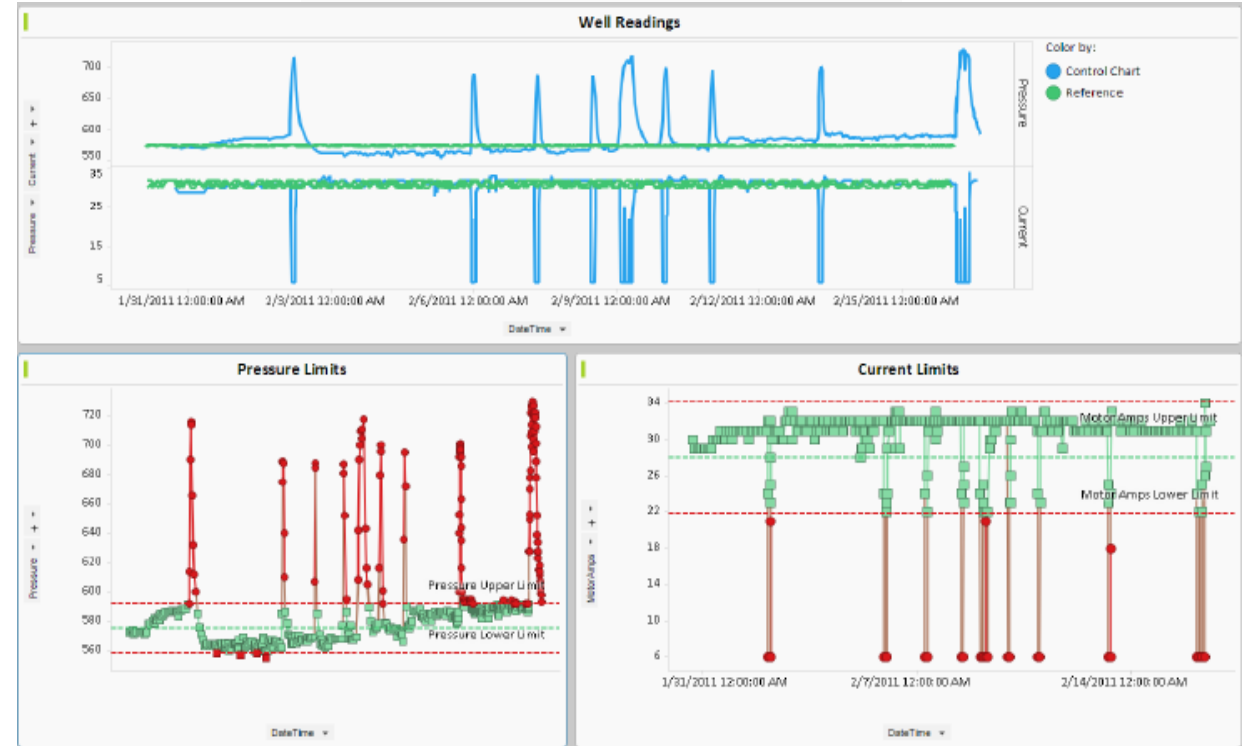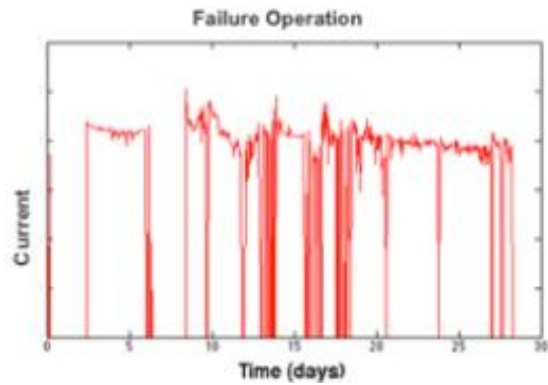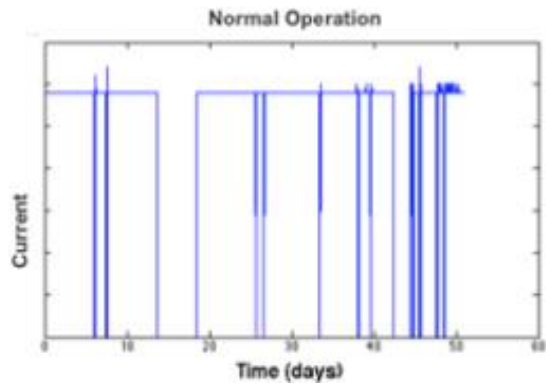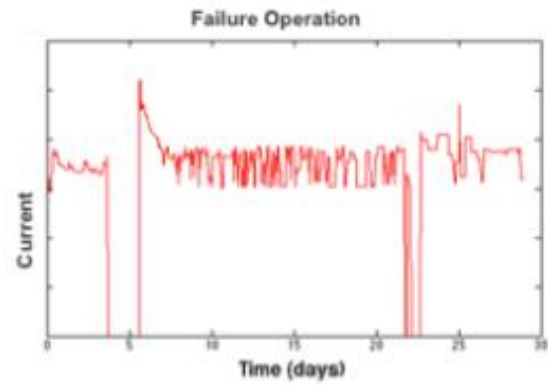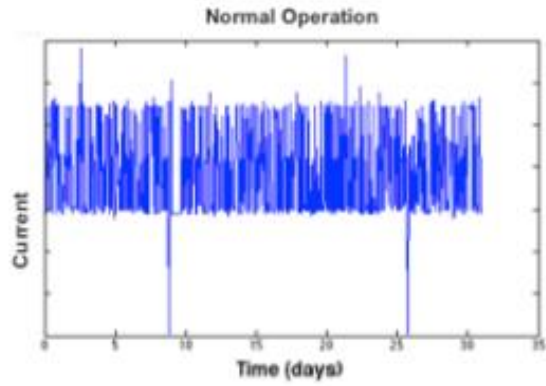
Thank You

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