

Society of Petroleum Engineers Lima Section

DIGITAL TRANSFORMATION IN WELL DRILLING PROJECTS

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Why are we here today?



GOOD OLD DAYS





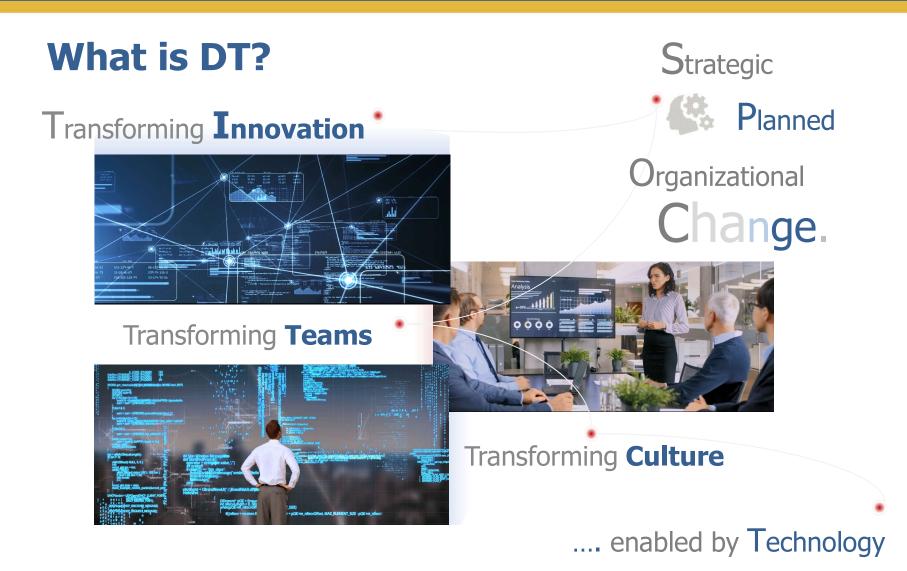
Content



- Digital Transformation (DT).
- Cepsa Digital Transformation.
- Data Management (DM) Technology.
- Data Quality Assurance & Quality Control (QA/QC).
- The Drilling Process.
- Drilling Data Analytics.









DT around the world:





Today Success

Today?



Technology creates a perfect storm of changes:



Big Data



The internet of things

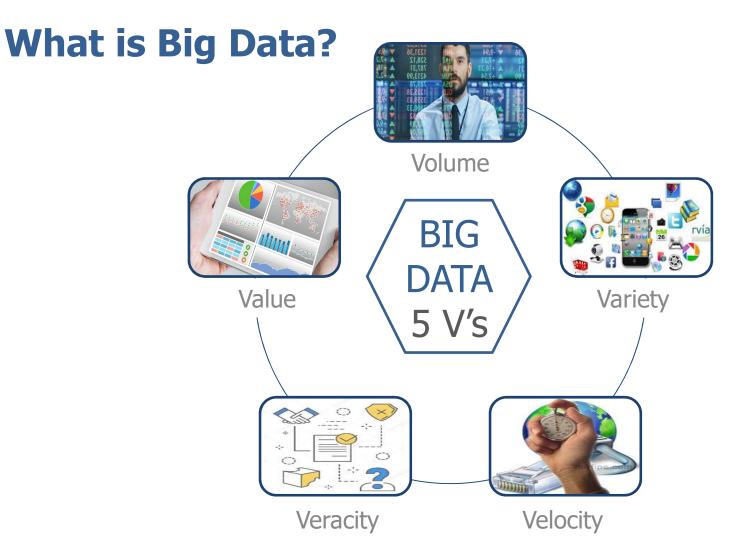


Robotic



Artificial Intelligence







Big Data Landscape:

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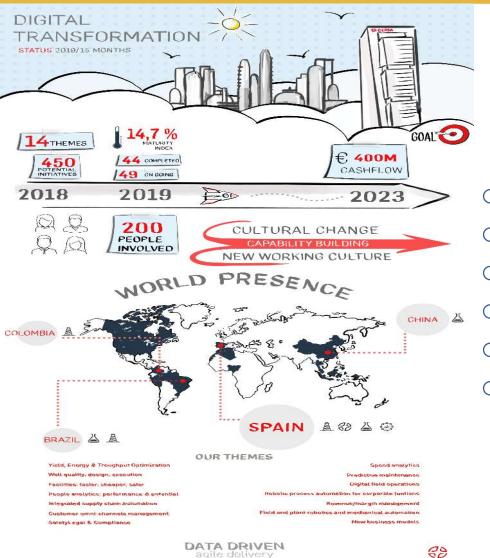
Big Data - What is cloud Computing?



It is the **glue** in digital transformation

CEPSA DT





\odot 15 months driving Cepsa's DT.

- o Cultural Overhaul
- Numerous Initiatives
- New Agile-based Working Ways
- o Best Decisions based on Data
- o Becomes More Efficient



data



104184

"Data Driven and Agile Delivery"

DATA DRIVEN

We have to build the Data Lake in order to support the construction of Product over it.

sign

algorithms

data

decisi

visualization

CEPSA DT



"Our people continuously learn how to achieve superior efficiency, flexibility and innovation for our customers and ourselves through the daily application of proven digital technologies, tools and methods" "





'The democratization of the Data'







There is a lot to do. Cepsa needs you.

HAPPEN



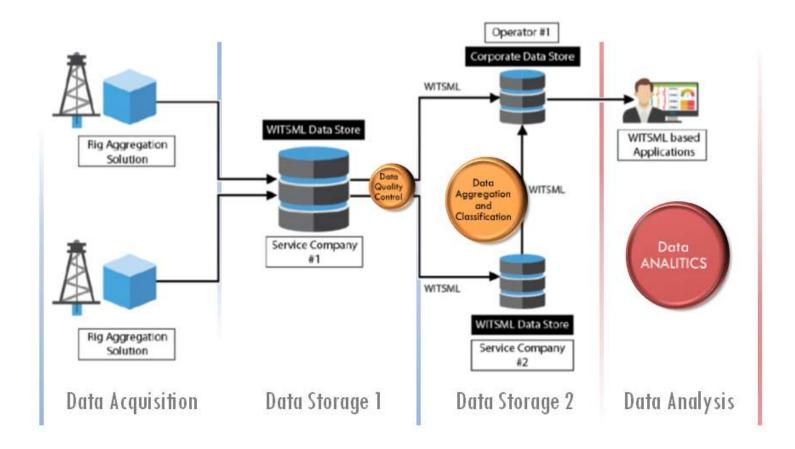
How can we take advantage of all this data?



Data Management (DM) Technologies



Data Exchange Standard Upstream O&G Industry







- Same data from different service companies.
- Time stamp in real-time data.

• Sensors calibration & consistency of measurement.

HD/RT Drilling Data (rig sensors, mud logging cabin, MWD/LWD data, cement unit, etc)

o Units of measurement.

... Reliability of data source is more important than acquisition method



Data Storage: Multiple Databases





DataBase 1

User 2



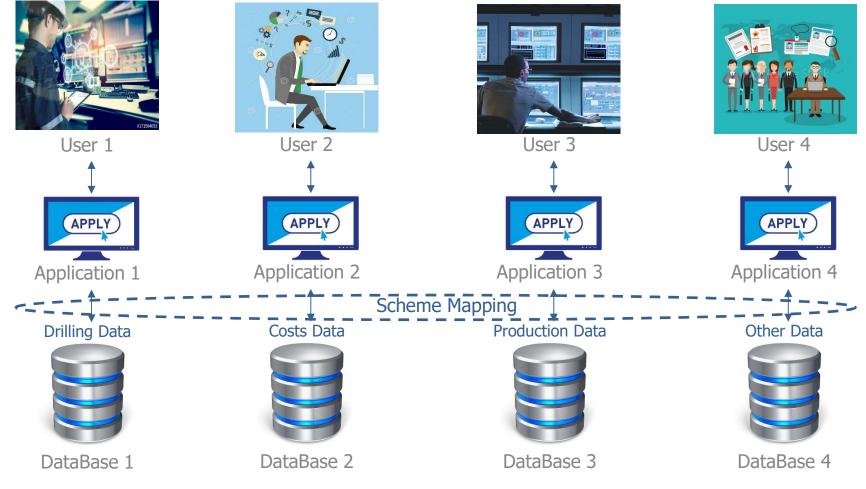
DataBase 3



Multiple Databases (Data silos)



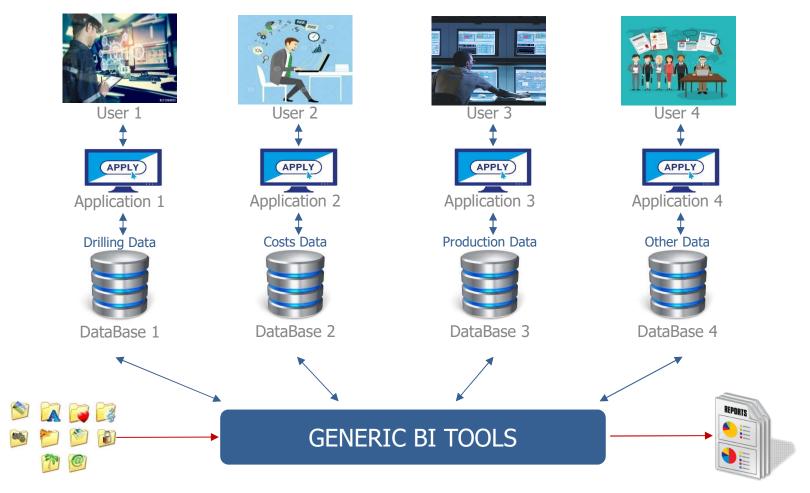
Data Storage: Multiple Databases



Multiple Databases (connectors and scheme mapping)



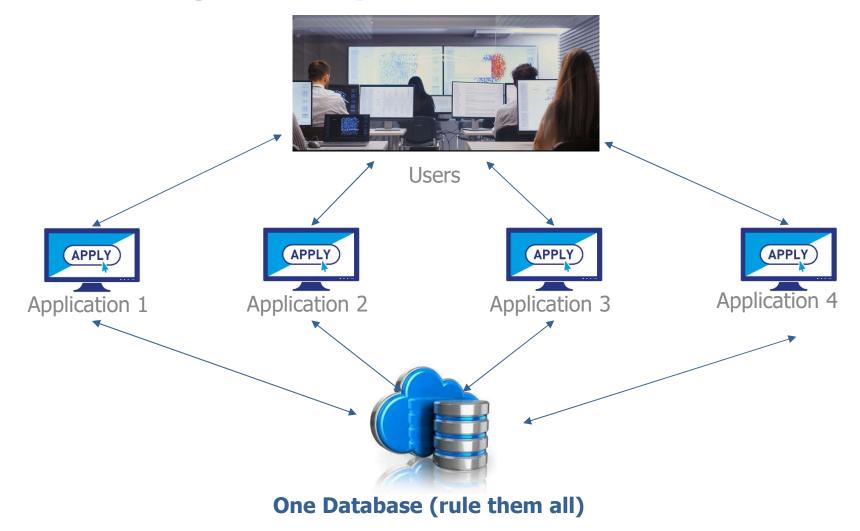
Data Storage: Multiple Databases



Multiple Databases (Combine data from different sources)



Data Storage: Multiple Databases

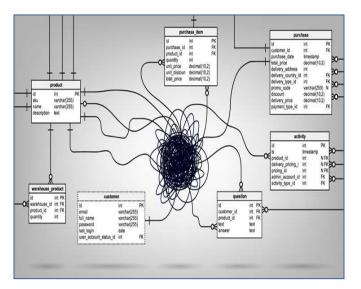


Data QA/QC Analysis



Data Quality Control Analysis

...Most common Errors in drilling database:



- Wrong datum/Unit.
- Inconsistency.
- Dispersed data source.
- o Outliers/anomalies.
- Bad relationship between data entities.
- Missing data.
- Data from uncalibrated/bad sensors.

Data QA/QC Analysis



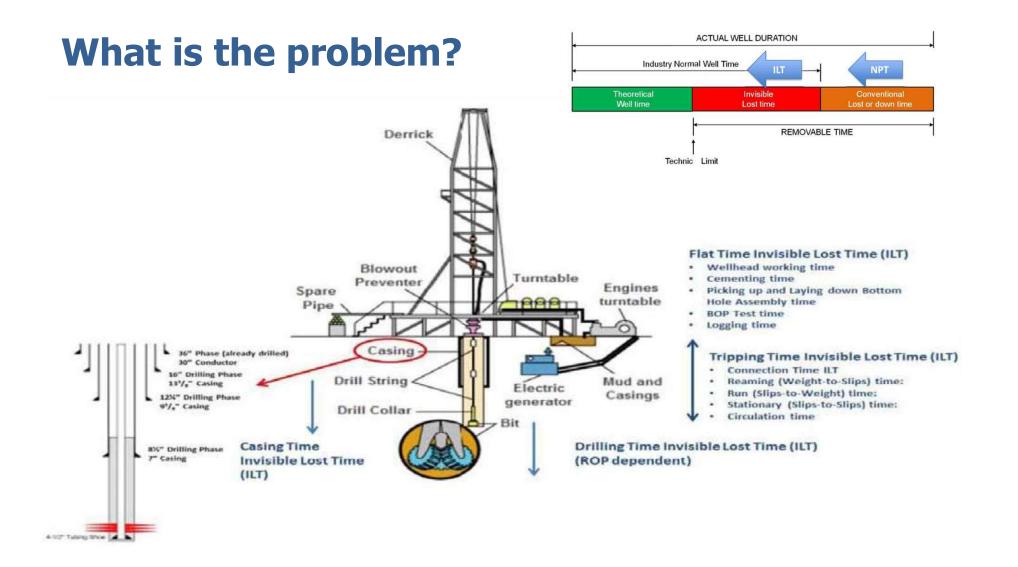


- What to clean?
- When to clean?
- How to clean?
- Who is cleaning?
- Where to keep cleaned data?

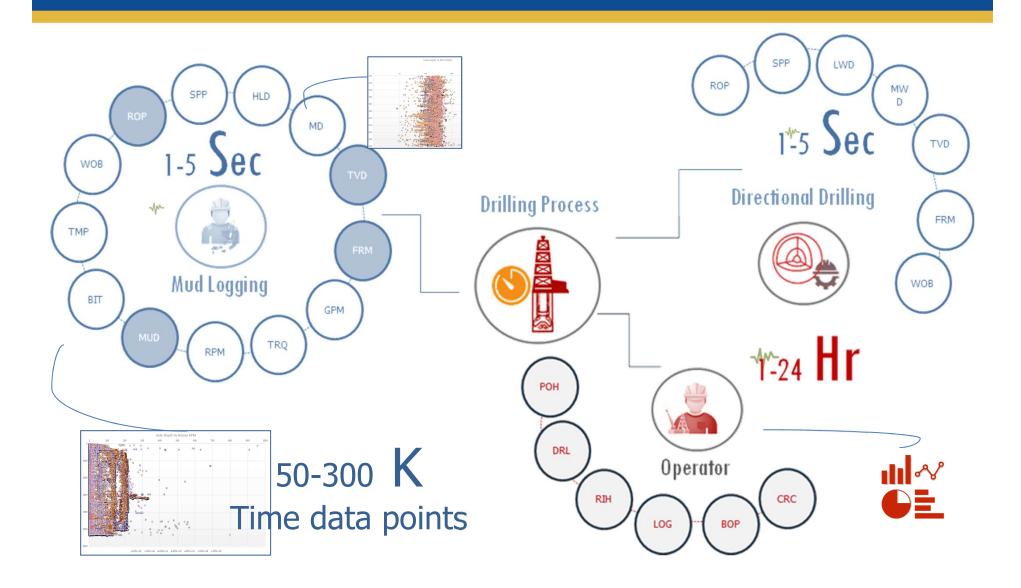


The Drilling Process



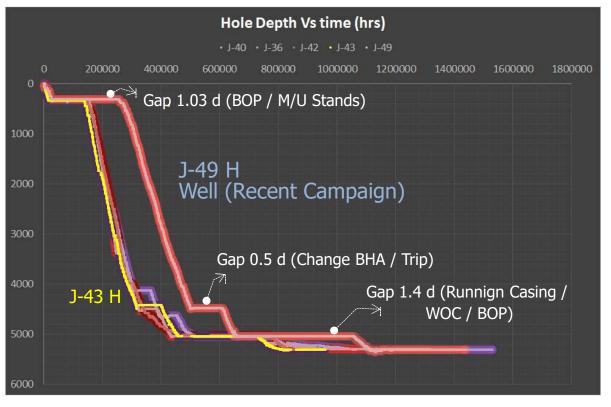








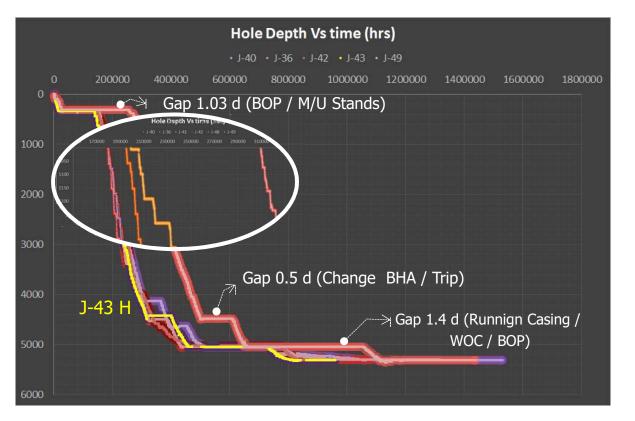
Traditional Approach?



- o Time Plan Vs Real
- Technical Limit
- o Best Performance
- NPT Analysis
- Flat Time Analysis
- o Average ROP



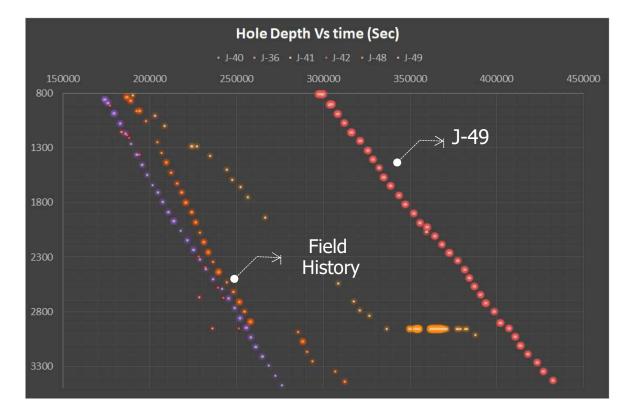
Can we do more?



- Reaming Stands
- Connection Time
- o Failures IRN
- o Effective ROP
- o Circulation Time
- DD settings



Interactive Filtering?



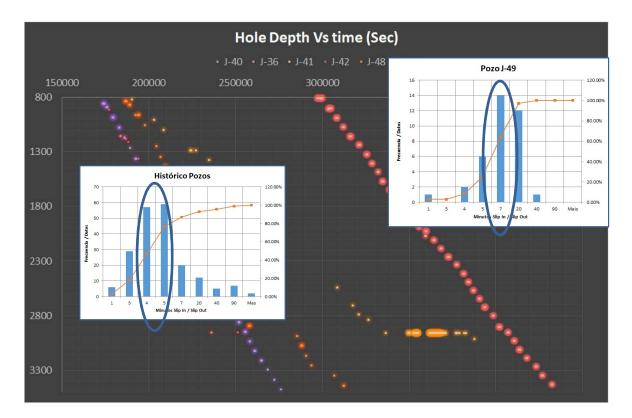
- o T Vs Depth Filter
- Hook Load Filter
- Drilling stage Filter

Slip In – Slip Out

o # Counts



Stats?

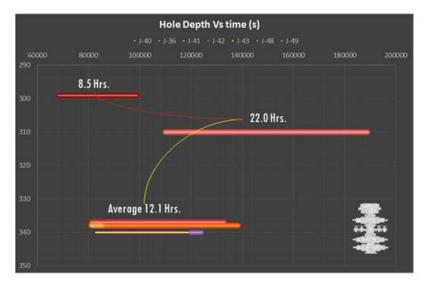


- T Vs Depth Filter
- Hook Load Filter
- Drilling stage Filter
- Slip In Slip Out
- o # Counts
- Histograms
- o Specific Tech Limit



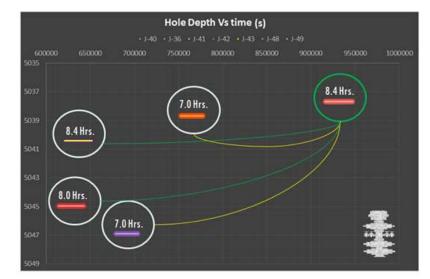
More Filtering?

Surface Casing Section



o T Vs Depth Filtero BOP Installation Filter Surface

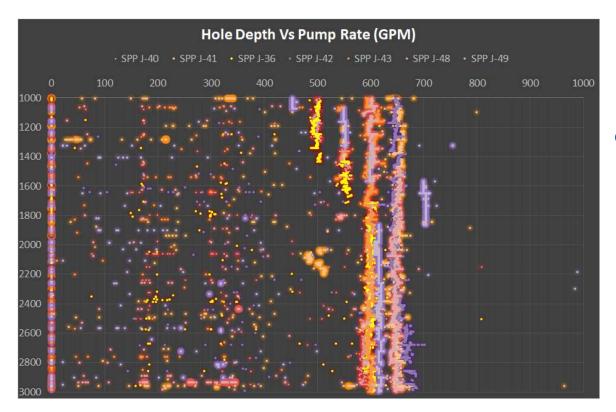
Intermediate Casing Section



o T Vs Depth Filtero BOP Installation Filter Intermediate



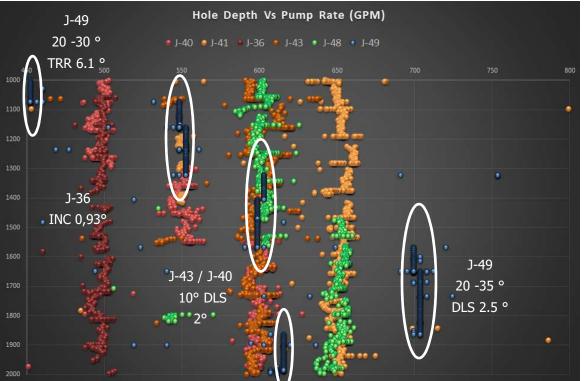
Digging Deeper?



• GPM Vs Depth Filter



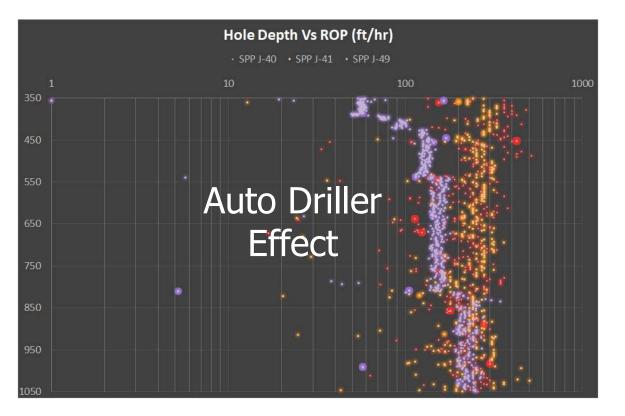
Digging Deeper?



- o GPM Vs Depth Filter
- DRL Filter
- GPM Filter
- Noisy Well Filter
- + Directional Survey
- ROP and Construction Analysis



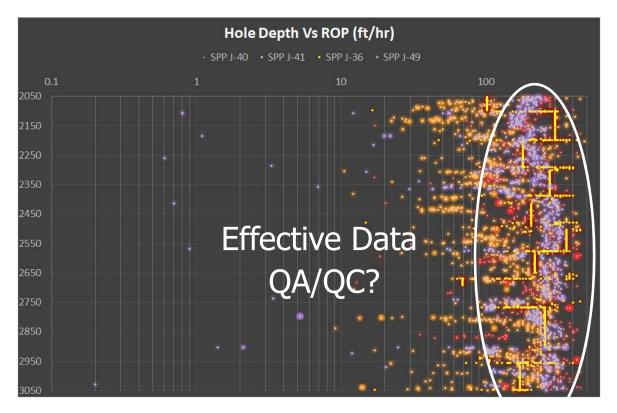
Digging Deeper?



- ROP Vs Depth Filter
- o DRL Filter
- o Depth Filter
- ROP Filter
- o Logarithmic Axis
- o Survey Analysis
- ROP & Construction
 Analysis



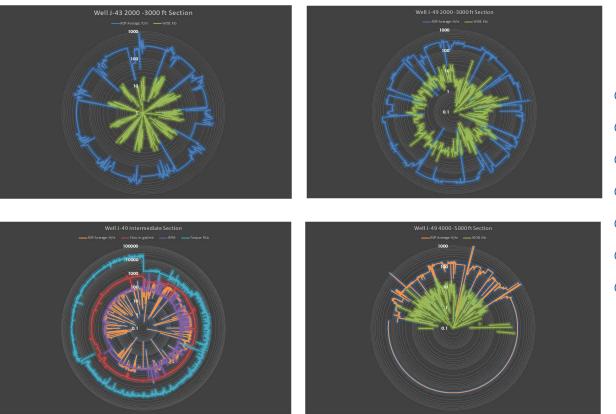
Take a Look ?



- ROP Vs Depth Filter
- o DRL Filter
- o Depth Filter
- ROP Filter
- o Logarithmic Axis
- o Survey Analysis
- ROP & Construction
 Analysis



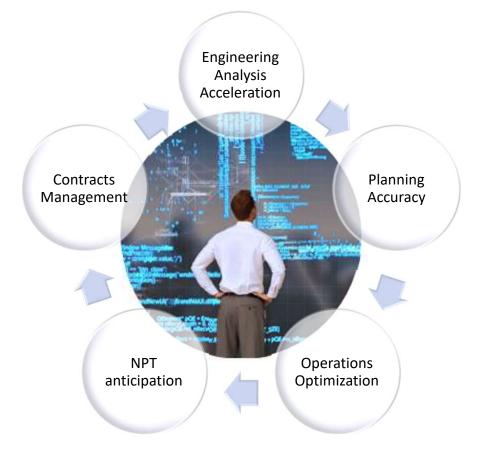
Take a Look ?



- Multivariable Analysis
- o DRL Filter
- o Depth Filter
- ROP Filter
- o Logarithmic Axis
- Next? Twin Modeling
- Monitoring Dashboard



How can we take advantage of all this data?



10 - 15 %

Capex

Reduction

References



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Thank you

Questions?



Society of Petroleum Engineers