

Society of Petroleum Engineers Lima Section

# DIGITAL TRANSFORMATION IN WELL DRILLING PROJECTS

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### Why are we here today?



#### **GOOD OLD DAYS**





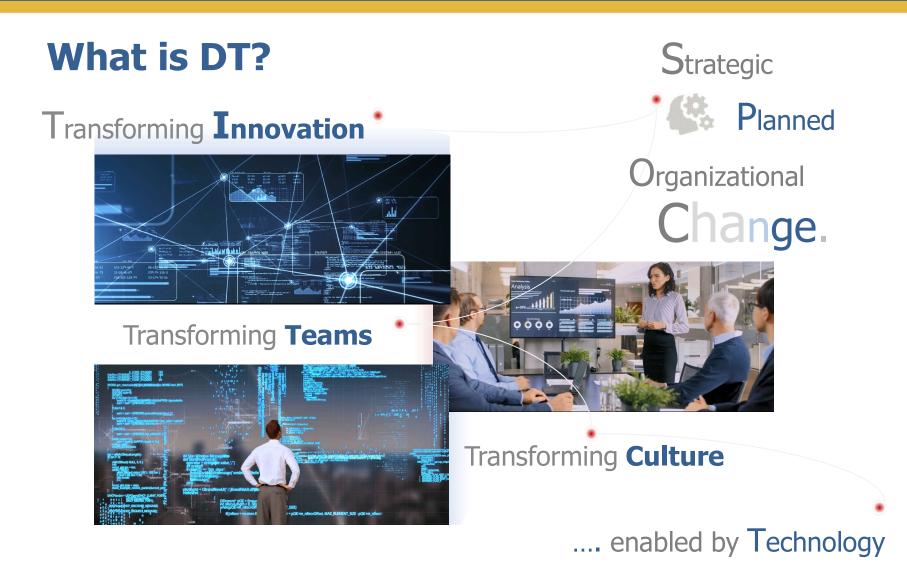
### Content



- 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

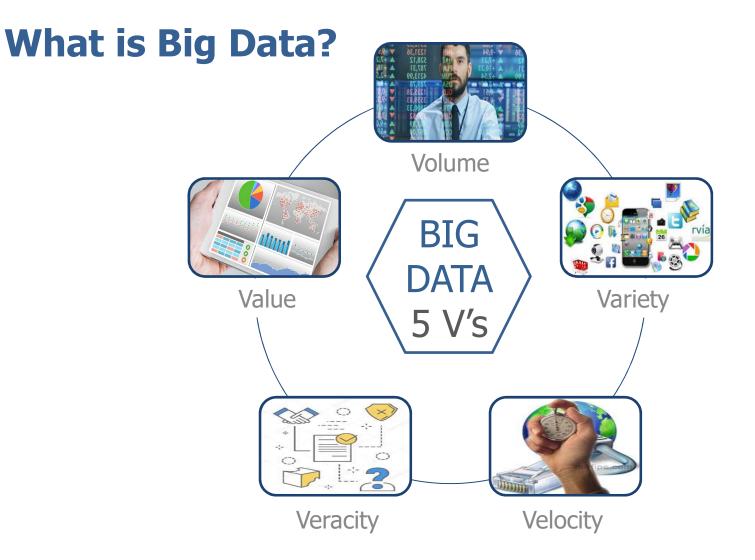


Robotic



Artificial Intelligence







#### **Big Data Landscape:**

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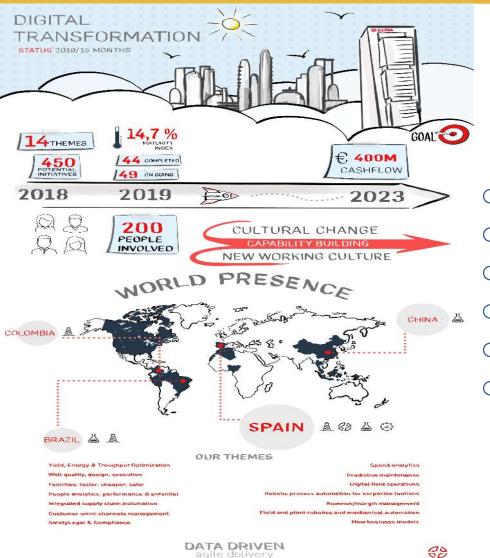
#### **Big Data** - What is cloud Computing?



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



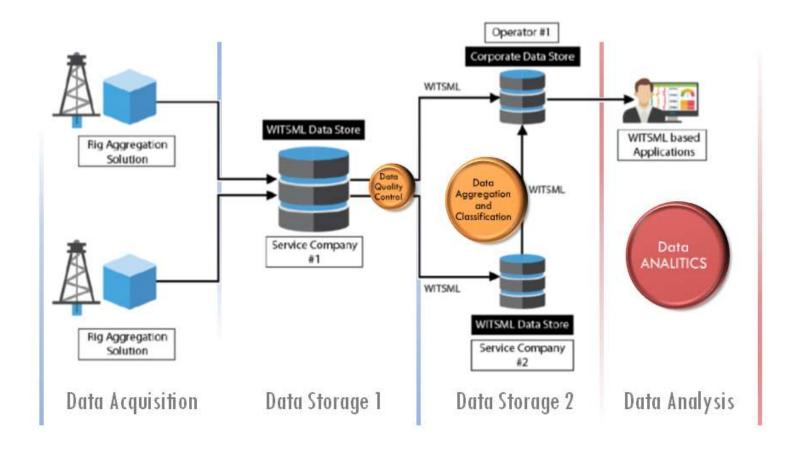
#### How can we take advantage of all this data?



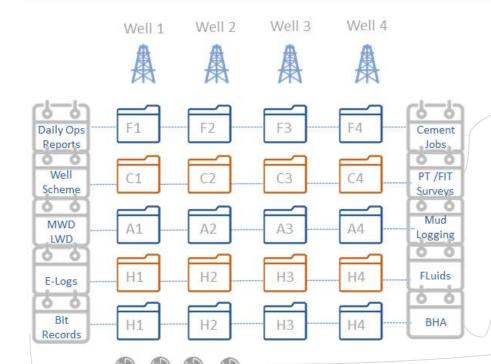
#### Data Management (DM) Technologies



#### **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



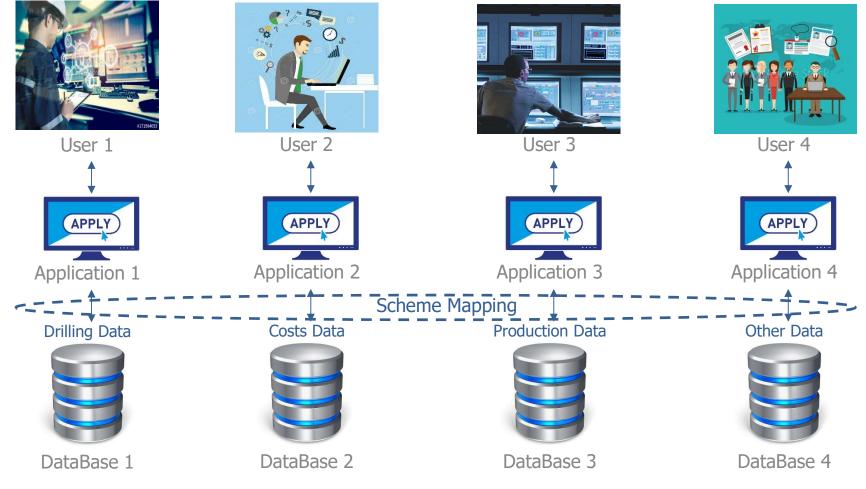
DataBase 3



#### **Multiple Databases (Data silos)**



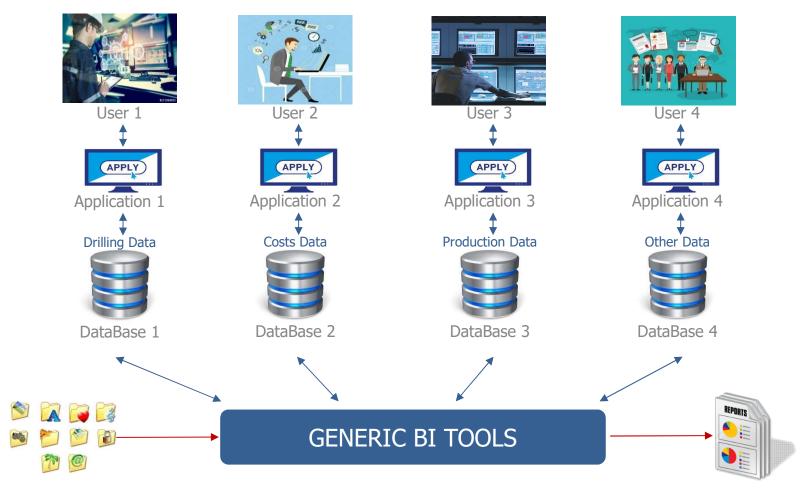
#### **Data Storage: Multiple Databases**



#### Multiple Databases (connectors and scheme mapping)



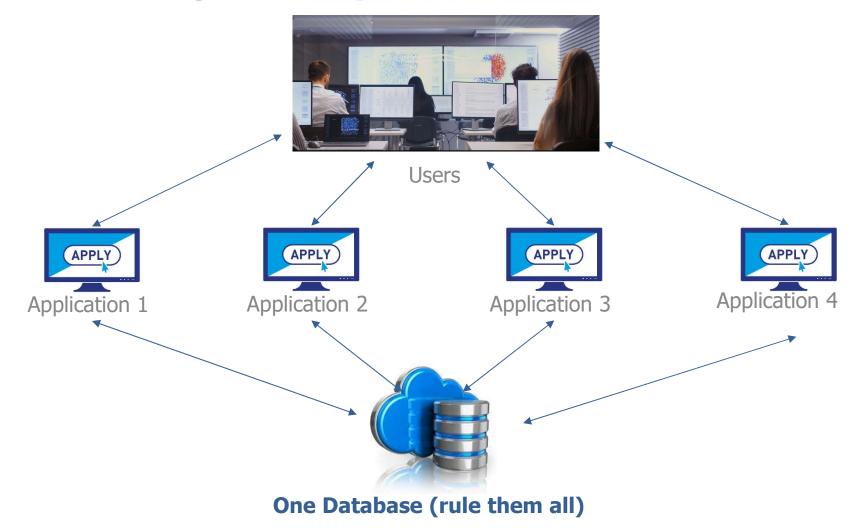
#### **Data Storage: Multiple Databases**



**Multiple Databases (Combine data from different sources)** 



#### **Data Storage: Multiple Databases**

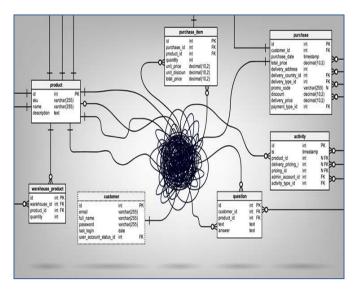


# Data QA/QC Analysis



#### **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



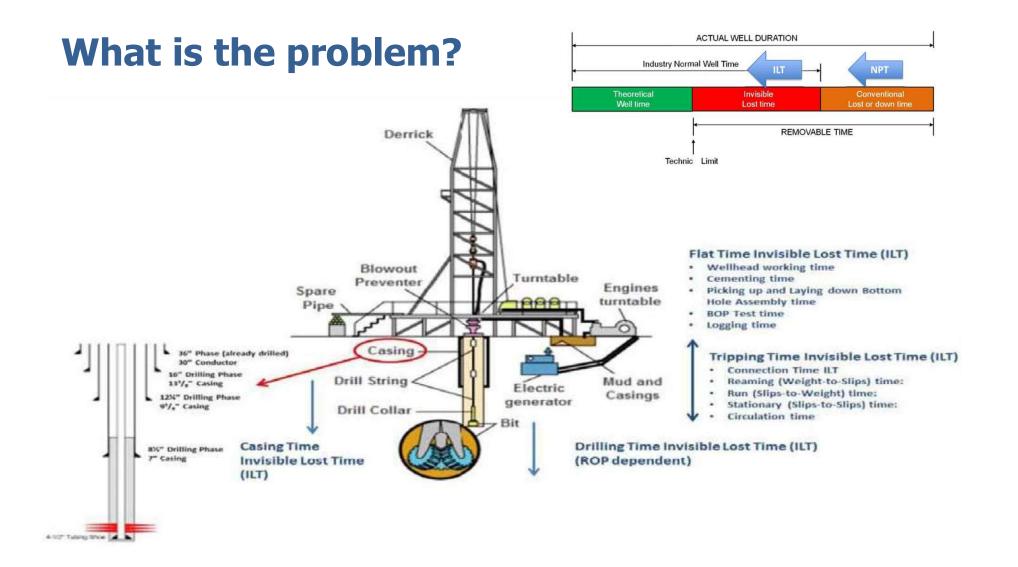


- What to clean?
- When to clean?
- How to clean?
- Who is cleaning?
- Where to keep cleaned data?

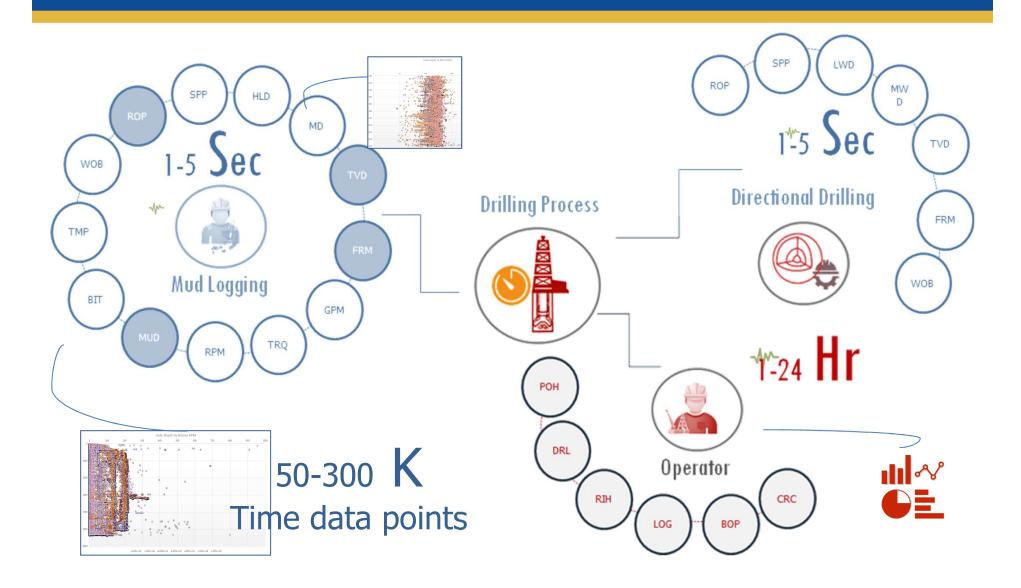


# The Drilling Process



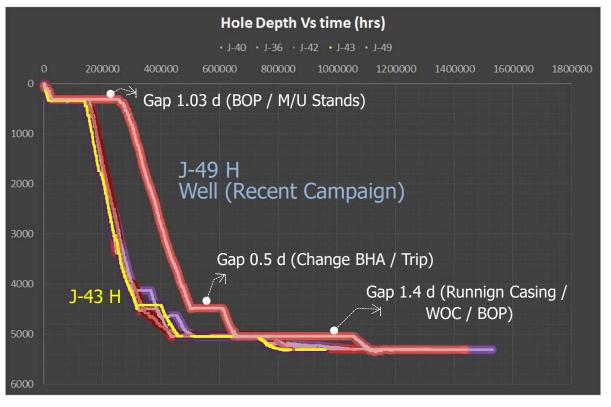








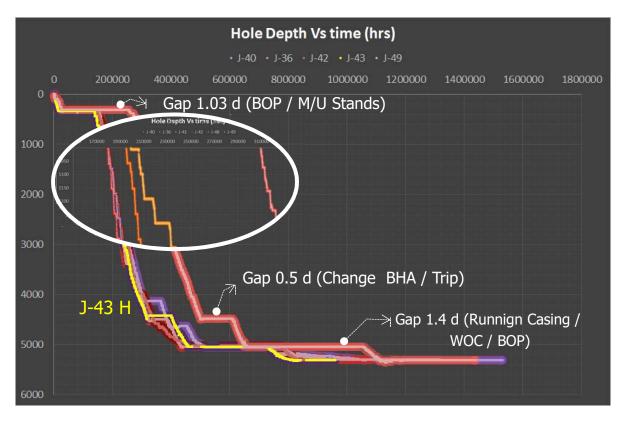
#### **Traditional Approach?**



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



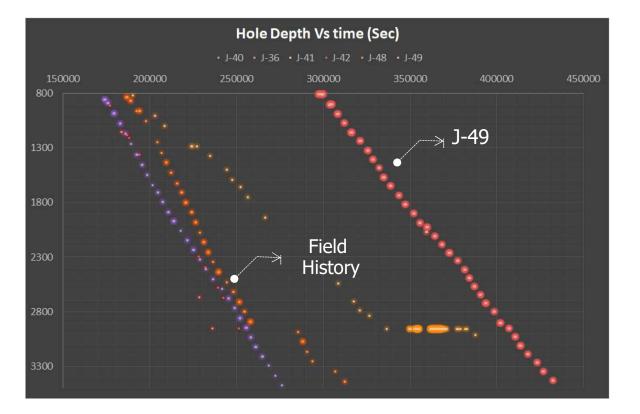
#### Can we do more?



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



#### **Interactive Filtering?**



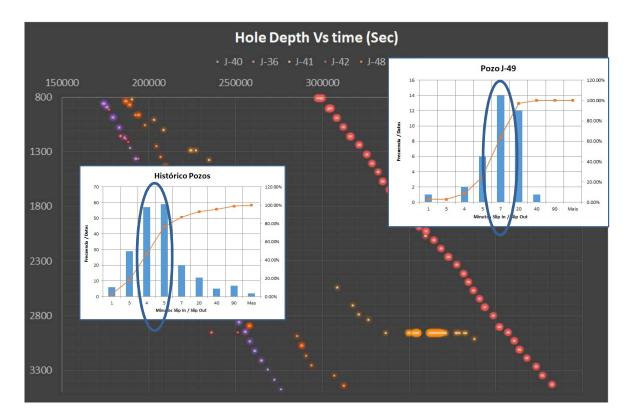
- o T Vs Depth Filter
- Hook Load Filter
- Drilling stage Filter

#### Slip In – Slip Out

o # Counts



#### Stats?

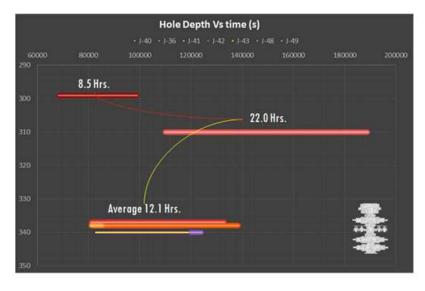


- T Vs Depth Filter
- Hook Load Filter
- Drilling stage Filter
- Slip In Slip Out
- o # Counts
- Histograms
- o Specific Tech Limit



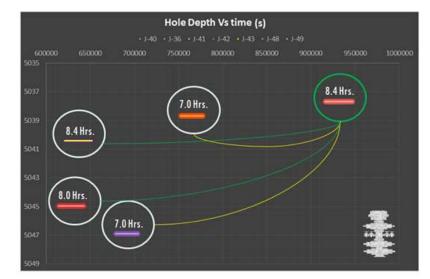
#### **More Filtering?**

#### Surface Casing Section



o T Vs Depth Filtero BOP Installation Filter Surface

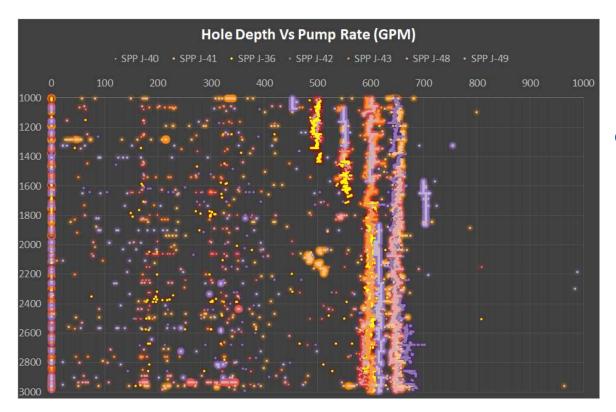
#### Intermediate Casing Section



o T Vs Depth Filtero BOP Installation Filter Intermediate



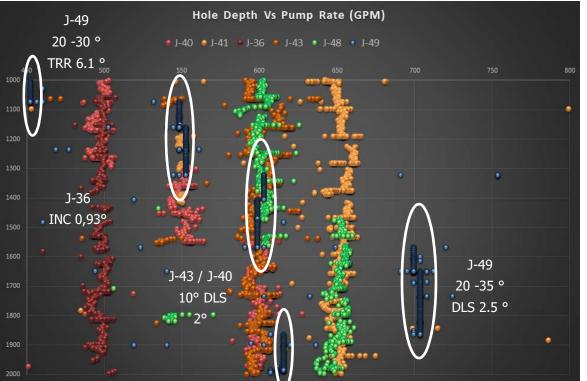
#### **Digging Deeper?**



#### • GPM Vs Depth Filter



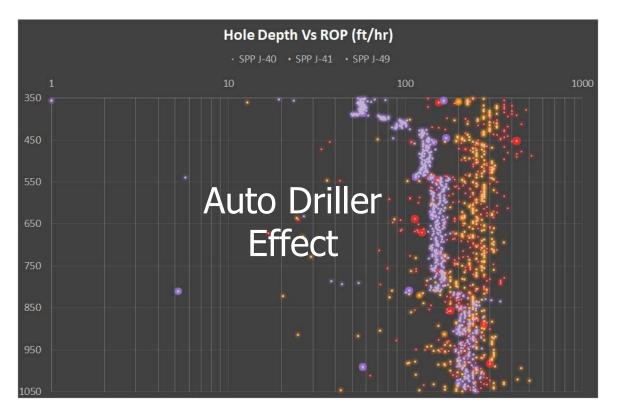
#### **Digging Deeper?**



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



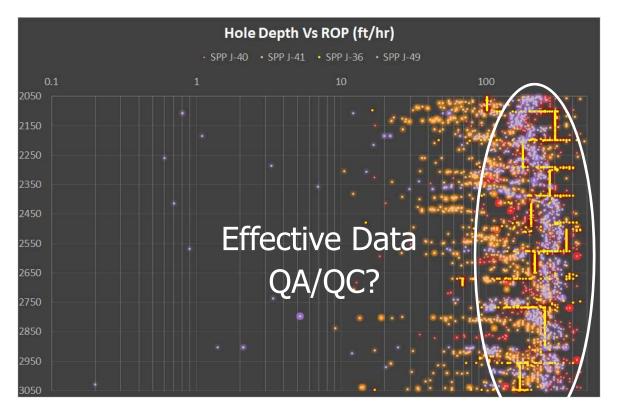
#### **Digging Deeper?**



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



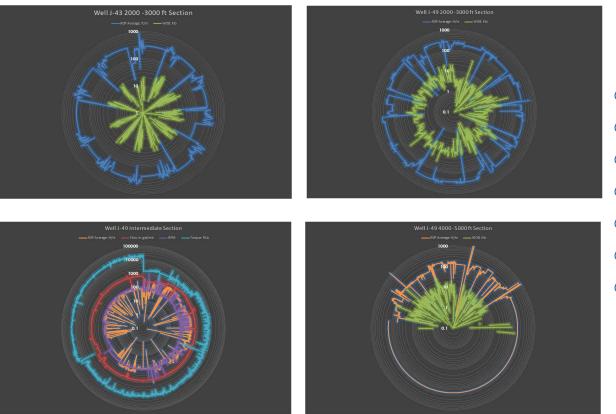
#### Take a Look ?



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



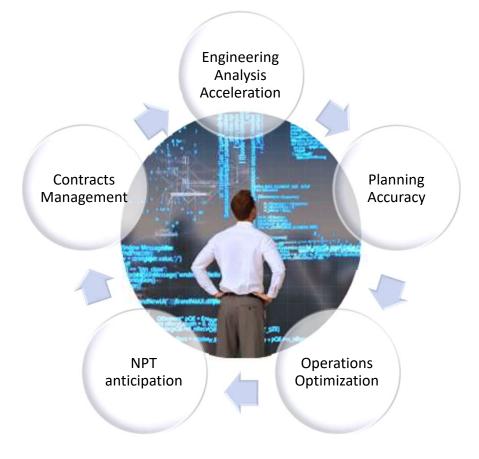
#### Take a Look ?



- 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**