SPEE Denver Chapter December 3, 2025, Luncheon Meeting. Speaker: Mr. Don Chenery will be speaking on

The Evolving Role of Data Management and Data Analytics in Reserves Management

Abstract.: In the dynamic field of reserves management, the interrelationship between advanced data management and effective data visualization is critical. This presentation explores the transformative impact of data visualization techniques on reserves evaluation and management, emphasizing the growing need to access, integrate, and analyze data from diverse sources. Our objective is to emphasize the current state of data visualization in the oil and gas industry and to highlight the pivotal role of sophisticated data management in driving innovation in reserves evaluation and management. We will chart the progression from traditional methodologies to modern practices that utilize sophisticated, interactive visualization tools supported by robust data management strategies. The presentation will feature examples to illustrate how the integration of diverse datasets into a single database architecture not only significantly improves the clarity and depth of visualization but also enhances transparency for users and decision-makers, facilitating more informed strategic decision-making.

Speaker Bio.: **Don Chenery** is the Product Director for VERDAZO at Omnira Software, where he brings deep domain expertise in upstream and operational oil and gas analytics. With a strong background in enterprise software, product strategy, and client services, Don is passionate about delivering user-driven solutions that enhance decision-making, improve efficiency, and unlock measurable business value.

Evolving Role of Data Management and Data Analytics in Reserves

SPEE Denver Luncheon

December 3, 2025

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Presenter

Don Chenery

Bio

As the Product Director for VERDAZO at Omnira Software, Don leads innovation in upstream oil and gas analytics. With extensive experience in enterprise software and upstream & operational workflows, Don focuses on delivering user-driven solutions that enhance decision-making and unlock measurable business value. Don is passionate about leveraging advanced data management and analytics to support reserves and planning teams in an evolving energy landscape.

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Evolving Role of Data Management and Data Analytics in Reserves

Agenda

- How much data and how valuable is it?
- Progression of Data Management & Analytics
- Putting this Data & Technology to use
  - Improved Forecasts & Reduced Uncertainty
  - Transparency & Repeatability
- AI's Promise & Reality

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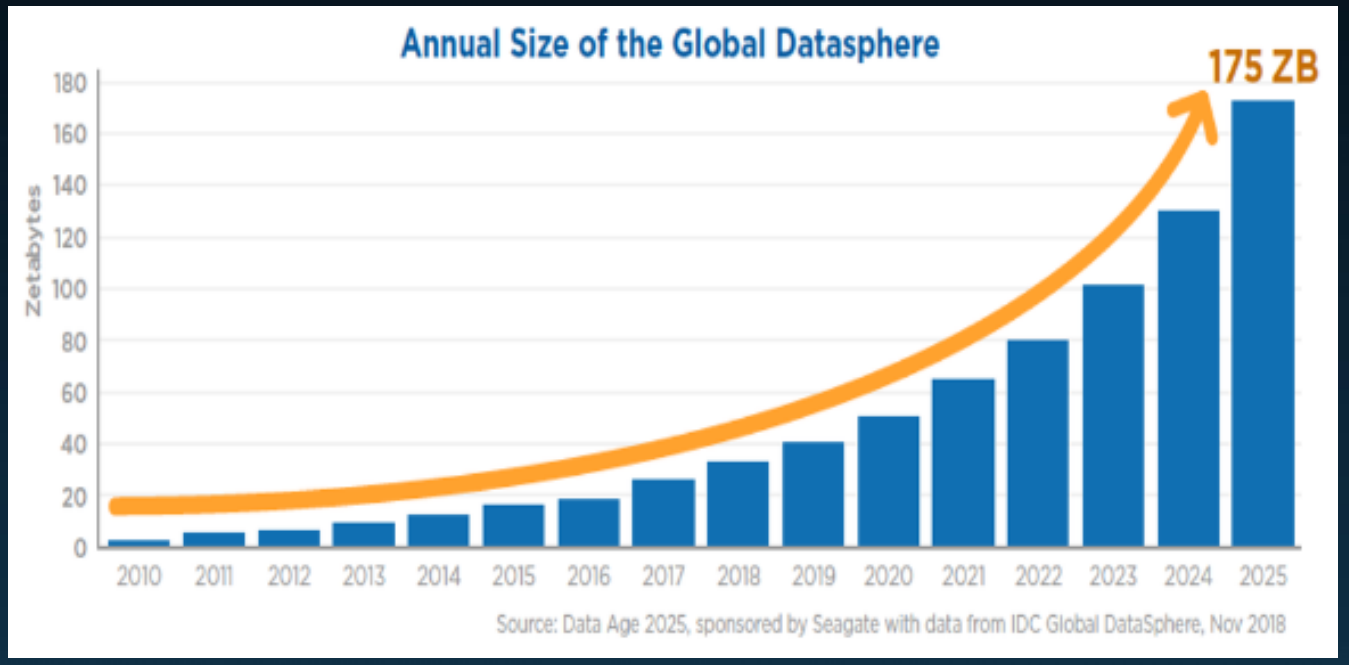
How Much Data Are We Talking About?

5 Exabytes is equivalent to the amount of data generated by all of humanity up to 2003!

The Oil & Gas industry is now generating this volume of data in ***ONLY 2 days***!



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How Much Data Are We Talking About?

If 1% of this is attributable to production, geological, completions, and operational data, we're still talking about ~25,000 TB per day.

Clearly, we have no problem generating data!

The question is: ***How do we find value in all this data?***

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Opportunities with Abundant Data

- Leverage wide array of best of available data for well-informed insights
- Inform your Forecasts with operational realities
- Test your interpretations from multiple angles
- Provide transparency, auditability & repeatability

GOAL: Increase confidence in Reserves by mitigating uncertainty and risk

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Why do I care about Uncertainty and Risk?

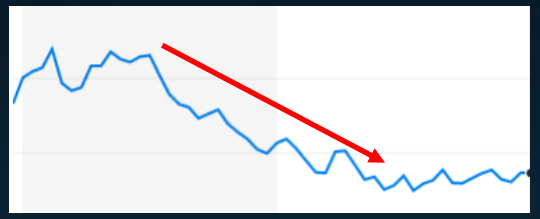
Market Capital Loss

Cashflow Shortcomings

Possible Reserve Write-Downs

Impacts on Stocks of Companies That Fell Short of Their Production Guidance:

Reduced by 40% in 8 months



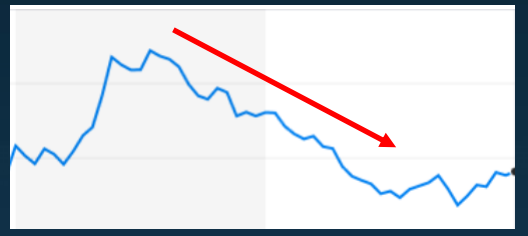
Reduced by 50% in 7 months

Reduced by 30% in 2 weeks

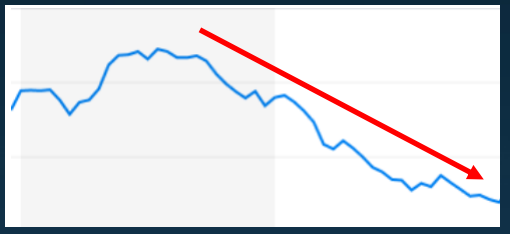
Reduced by 40% in 8 months

Reduced by 70% in 8 months

Reduced by 26% in 1 month



Reduced by 40% in 8 months



Reduced by 40% in 8 months

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Reduced uncertainty in forecasts?

- Understand:
  - Operational reality
  - Performance drivers
- Improve analog selection
- Test analog fitness & improve sample size
- Identify & mitigate sources of bias
- Hindcast & improve future forecasts

By improving the quality & quantity of data and insights, you can reduce uncertainty

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Where Does Your Data Live?

How many data systems do you have? Just to name a few:

Reserves & Forecasting	*Field Data Capture*	*Geological* & Geophysical
Completions	*Public Data*	Well Lifecycle
Production Accounting	Financial Accounting	Land

Highest value data for:

- Improving forecast accuracy for developed wells
- Reducing uncertainty & risk in forecasting undeveloped wells

How do we efficiently integrate and leverage this valuable data?

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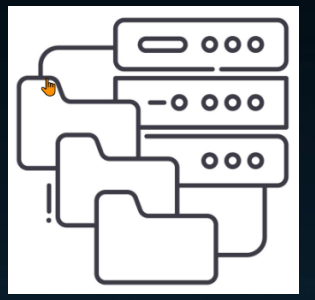
Data Management Methodologies

Manual Data Management

Paper and Electronic Files, Email, Lotus Notes, etc.

- Error-Prone
- Scalability Challenges
- Lack of Data Integrity and Security
- Lack of Collaboration
- Unable to Integrate Data for Analysis



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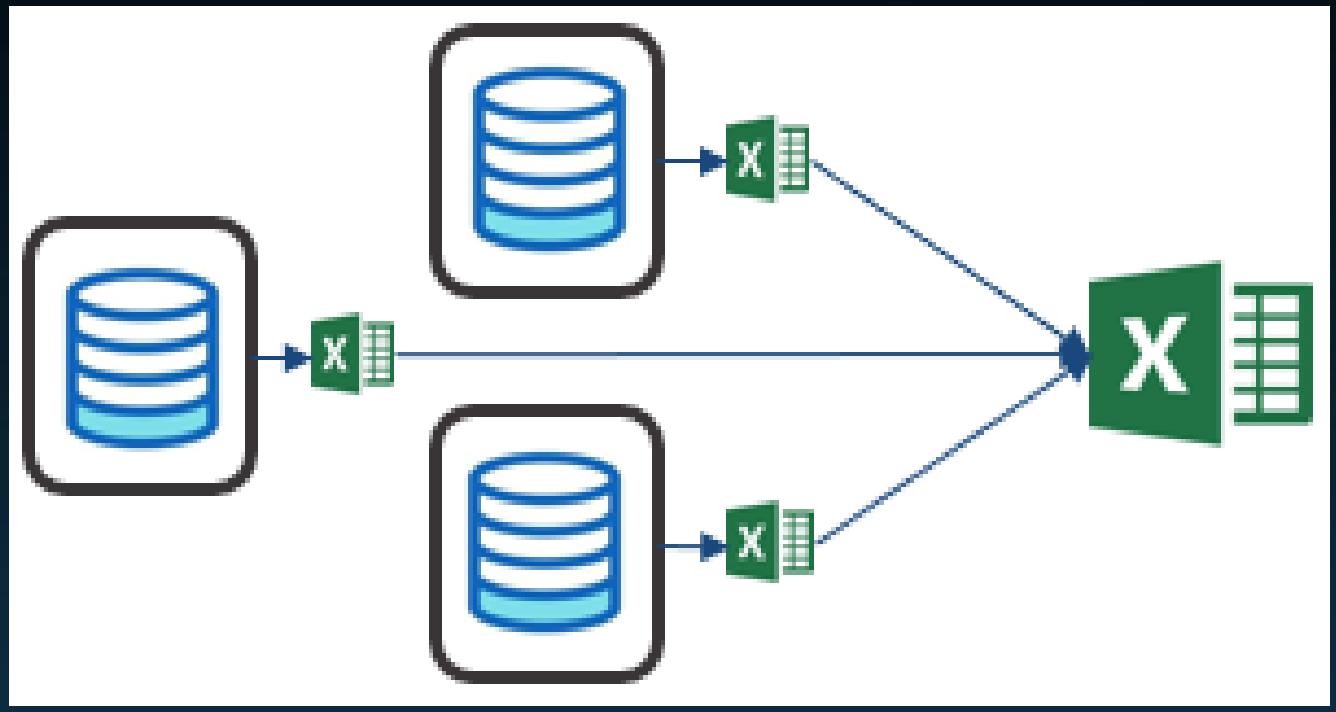
Data Management Methodologies

Isolated Databases

Systems of Record, Custom Databases

- More Efficient and Improved Accuracy
- Built for a Specific Purpose
- Data Redundancy and Inconsistency
- Lacks Data Governance Across Databases
- Challenging to Link Data Across Systems



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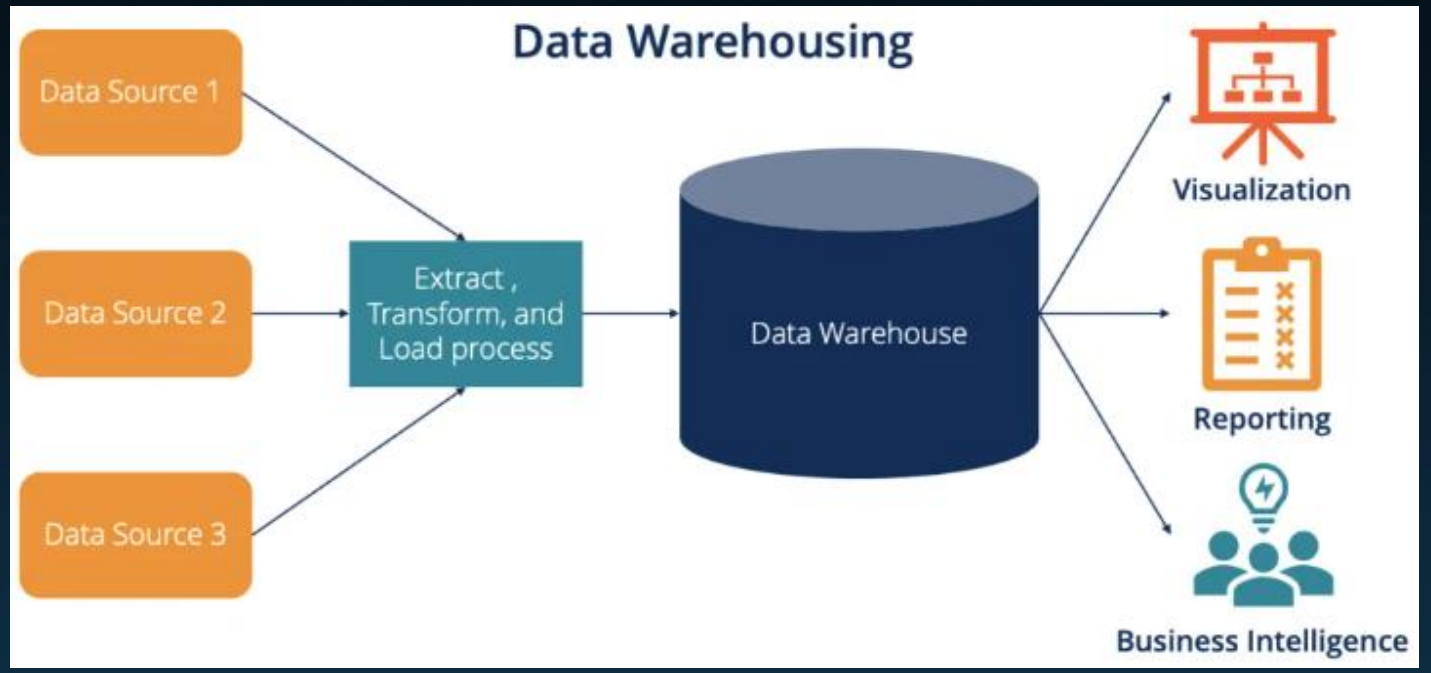
Data Management Methodologies

Centralized Data Storage

Data Warehouses and Data Cubes

- Centralized, Governed Data
- Costly and Prolonged Development
- Scalability and Maintenance Issues
- Data Integration Complexities
- High Degree of Duplication



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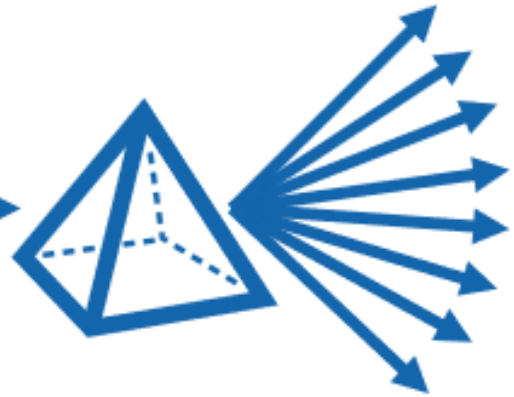
Scalability Considerations

So many potential dimensions of data can lead to large scale duplication in Data Warehouses

Singular Data Element → **HUNDREDS of Possible Dimensions**

Daily Oil Volume (m3) →



- Metric & Imperial
- Volumes & Rates
- Totals & per-Well Averages
- Daily, Monthly, Quarterly, Yearly, Total
- Time Normalized
- Time Condensed
- Dimensionally Normalized
- Inclusion in Calculations

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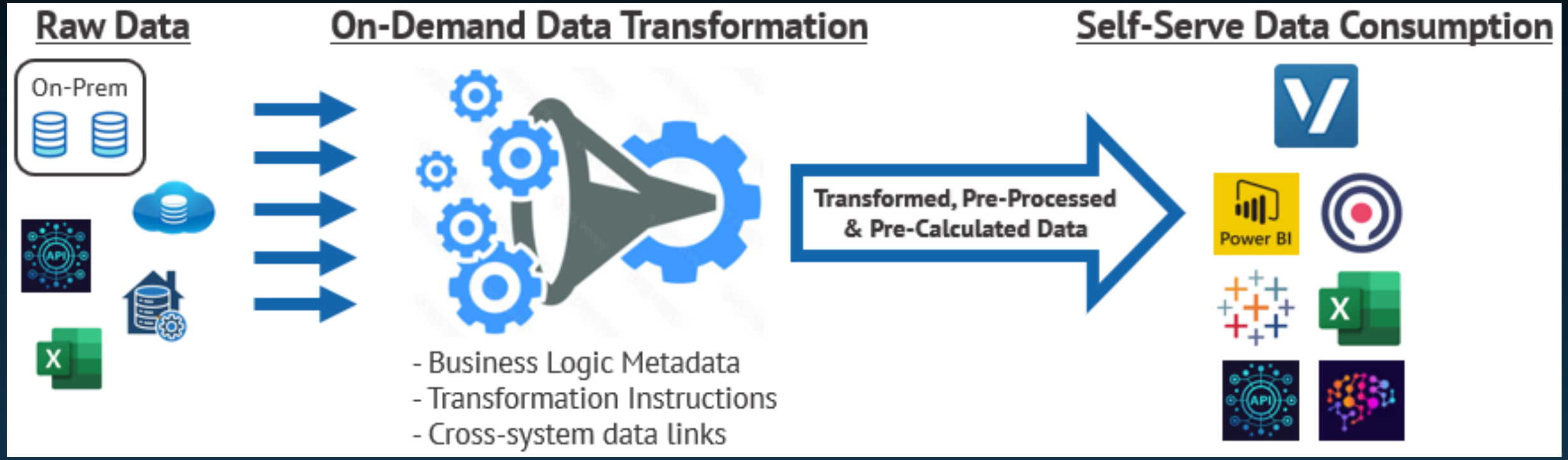
Data Management Methodologies

Data Pipelines ✅

On-Demand Transformations and Calculations



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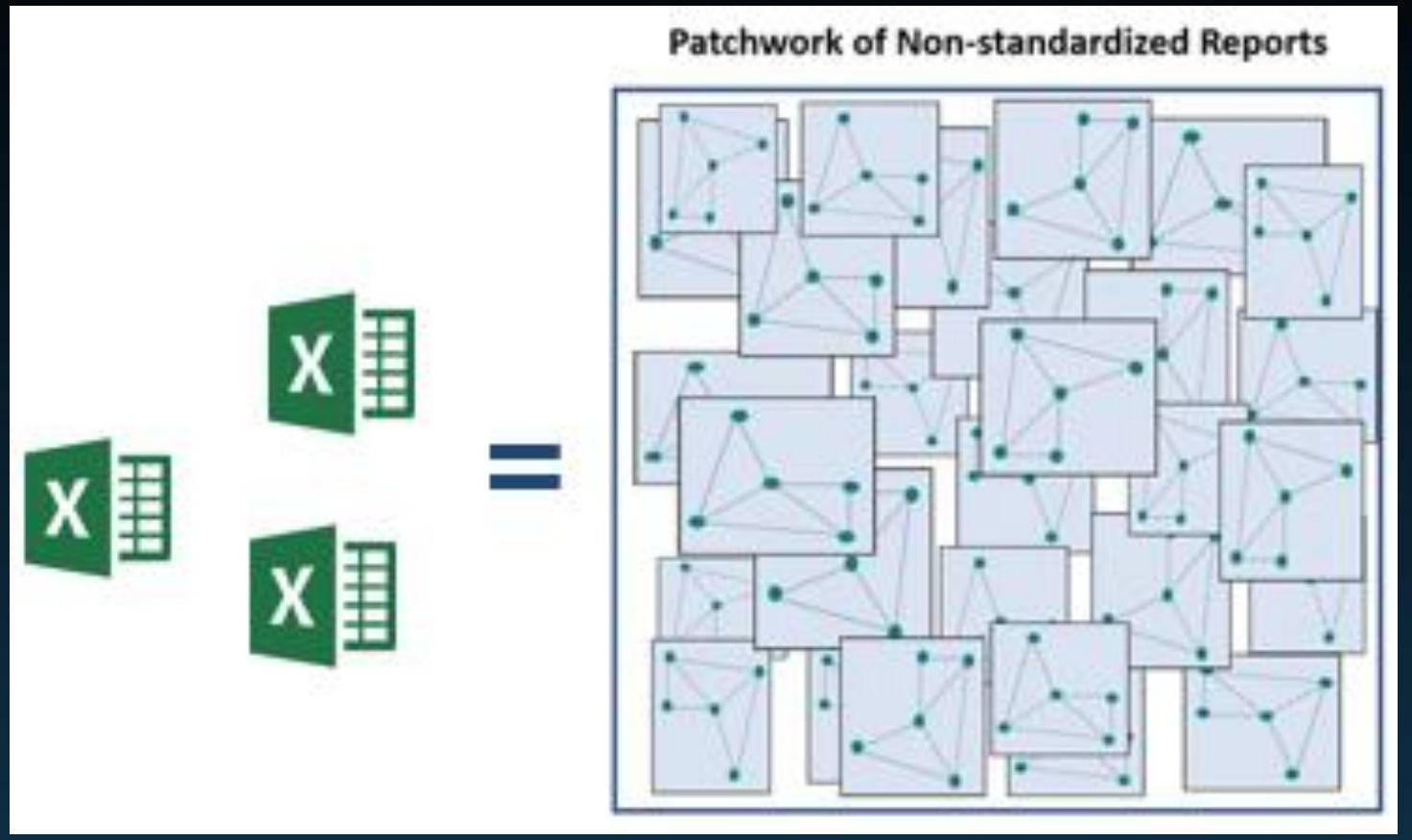
Analysis & Visualization Methodologies

Manual Spreadsheets

Excel, Excel, and more Excel

- High degree of User Flexibility
- Labor Intensive and Error-Prone
- Lack of Standardization
- High Degree of Duplication
- Scalability and Performance Issues



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Analysis & Visualization Methodologies

Corporate BI Applications

SAP Business Objects, Crystal Reports, IBM Cognos

- Greatly Improved Consistency and Accuracy
- Complex and Costly Development
- Lacks Self-Serve Capabilities
- Builder vs. Consumer Model
- Lacks Flexibility and Agility
- Challenging to Integrate data from Disparate Systems

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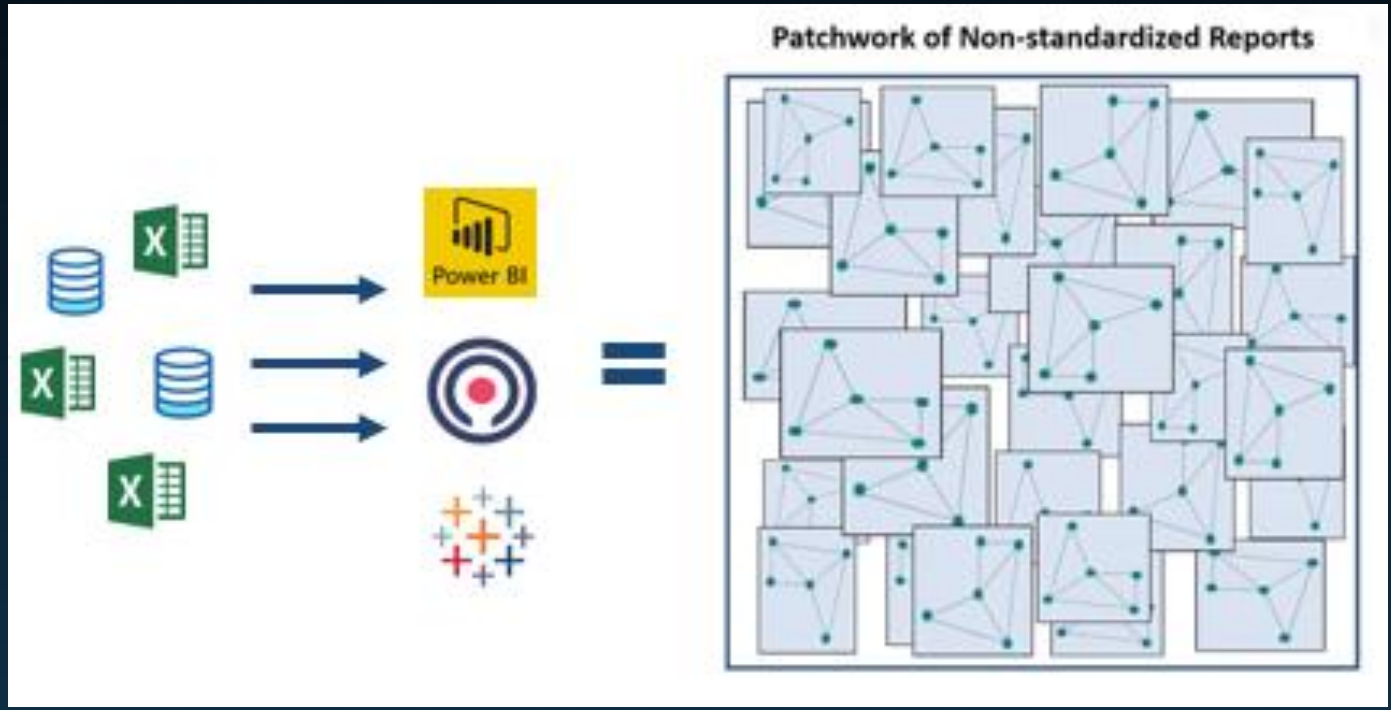
Analysis & Visualization Methodologies

Modern Dashboarding Tools

PowerBI, Spotfire, Tableau

- Interactive Visual Reporting for Task Specific Purposes
- Focus on Builder Flexibility
- Unmanaged, Uncentralized Calculations
- Challenging to Scale to Enterprise
- Proliferation of Near Duplicate Dashboards



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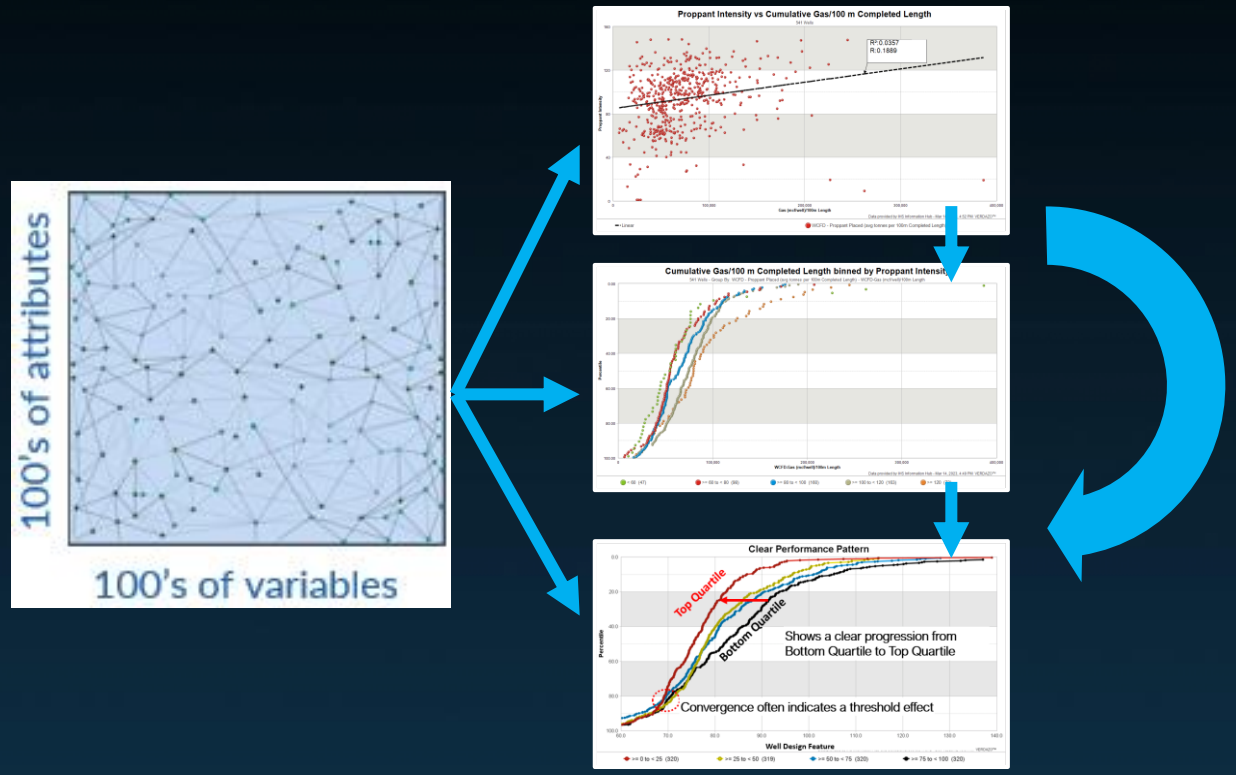
Analysis & Visualization Methodologies

Discovery Analytics

Self-Serve Data Discovery Tools

- Emphasis on End-User Flexibility
- Focus on Unscripted Analysis and Collaboration
- Unrestricted Drill-Down and Lateral Analysis
- Dynamic Data Transformations and Binning
- Supercharged When Built Specifically for Oil and Gas Workflows



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Putting the Technology into Practice

Developed Wells

- Improve the accuracy of forecasts based on understanding of operational reality
- Increase reserves through operational improvements
  - Timely and accurate insight on operational issues
  - Proactive corrective action

Undeveloped Wells

- Reduce/Mitigate uncertainty
- Improve the quality of TWP-based forecasts:
  - Analog Selection
  - Analog fitness testing
  - ID of performance determinants
  - Bias mitigation
  - Transparency & auditability
  - Repeatability & hindcasting

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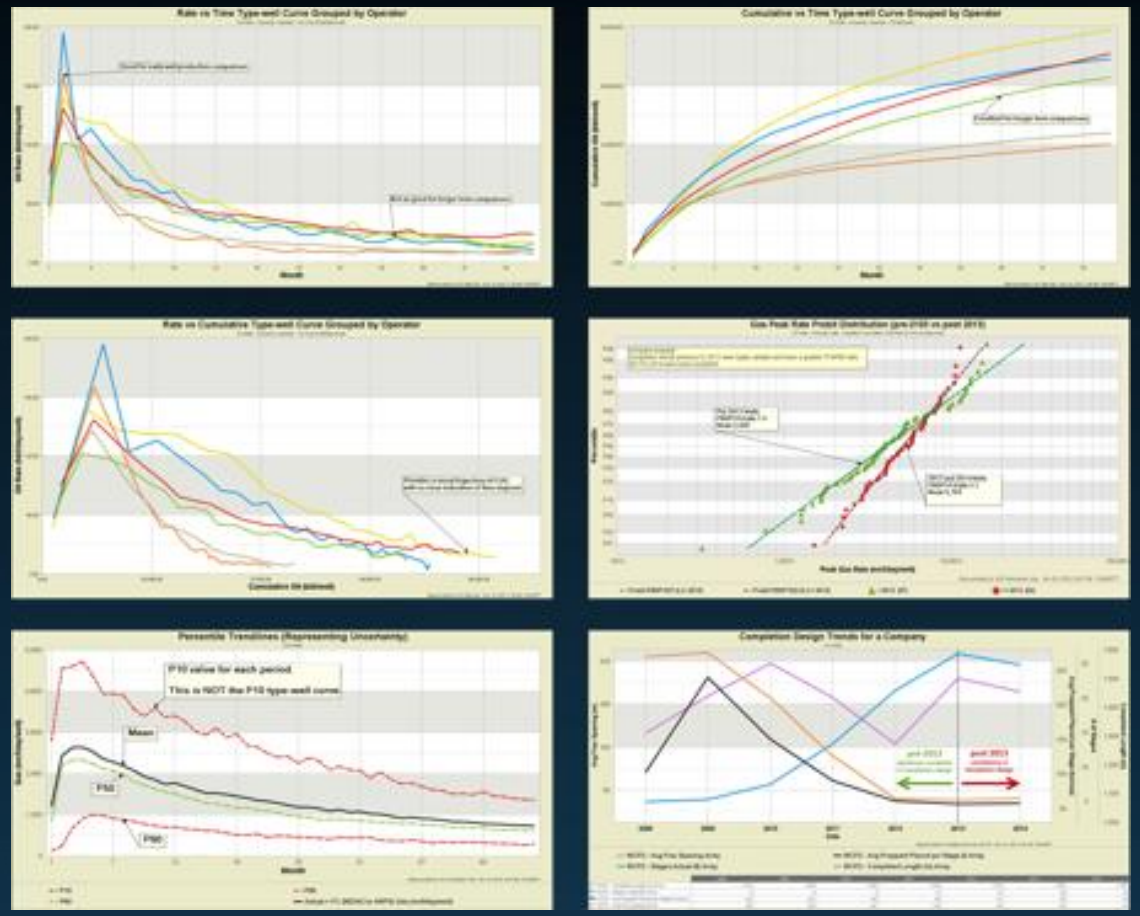
The value of multiple perspectives

- Group behaviour
- Individual performance
- Group totals
- Individual totals
- Diagnostic
- Statistical characterization
- Correlation
- Early time performance
- Late time performance



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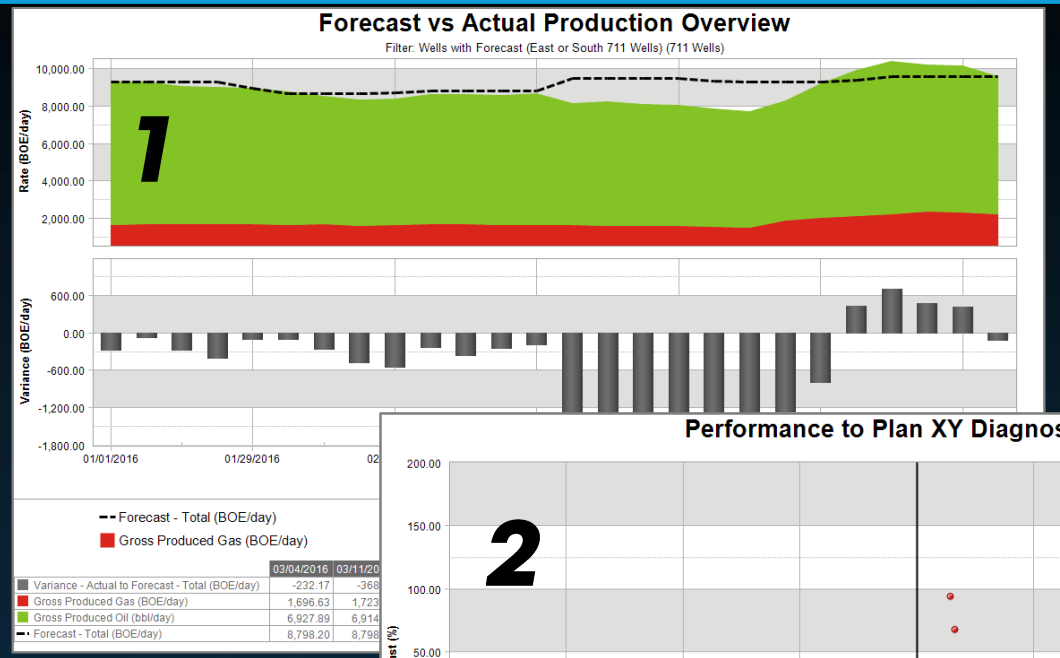
Opportunities can be Obscured

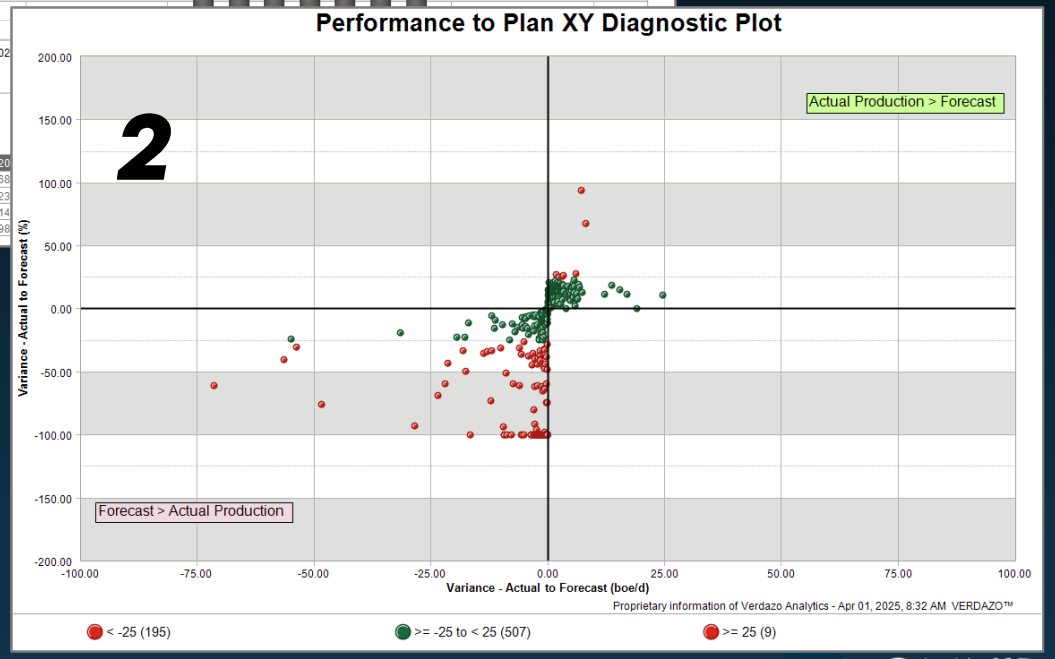
Chart 1

- Roll-up Time Series
- Everything is producing according to plan

Chart 2

- XY Diagnostic Plot
- Opportunities to raise the forecast
- Potential opportunities to improve performance
- ***Net impact = Improved Reserves***





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Type Well Profiles

Type Well Profiles are an important tool in predicting the future performance of Undeveloped Wells

Some of the key considerations when building Type Well Profiles:

- Analog Selection & Fitness assessment
- Bias mitigation

Data Selection	***Analysis & Construction***		***Application***
Sample Size Bias	Normalization Bias	Performance Bias	Program Size
Selection Bias	Vintage Bias	Sequence Bias	Forecast Bias

- Determinants of Production Performance
- Transparency, Repeatability & Hindcasting

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Analogue Selection Dilemma

Statistical Power
(sample size)

Fitness
(analogue-ness)

The sacrifice of representativeness for sample size?

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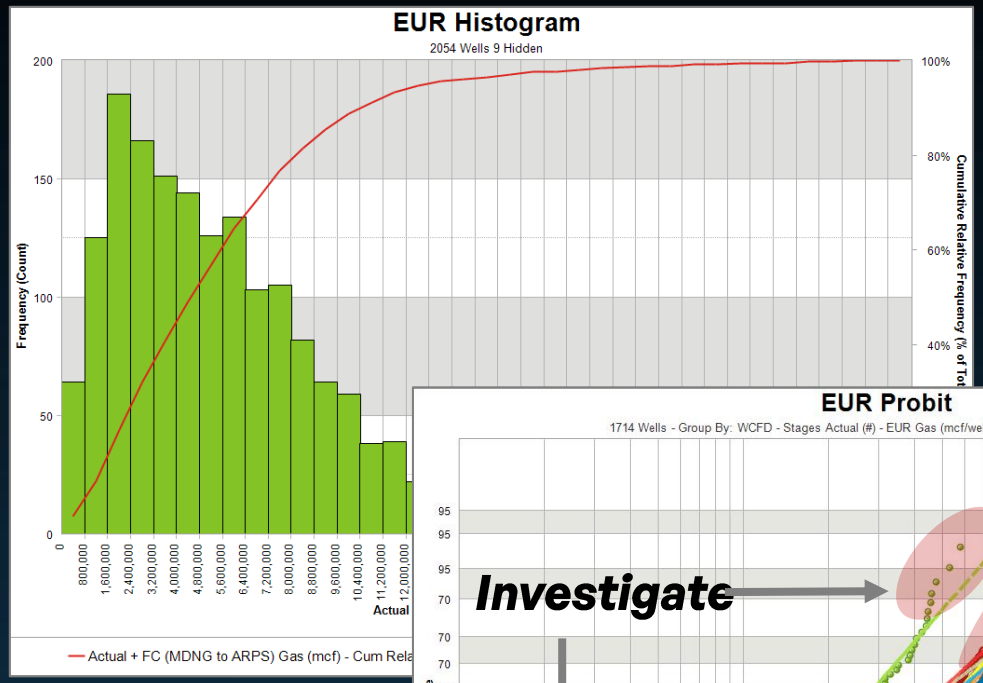
Analog Selection & Fitness

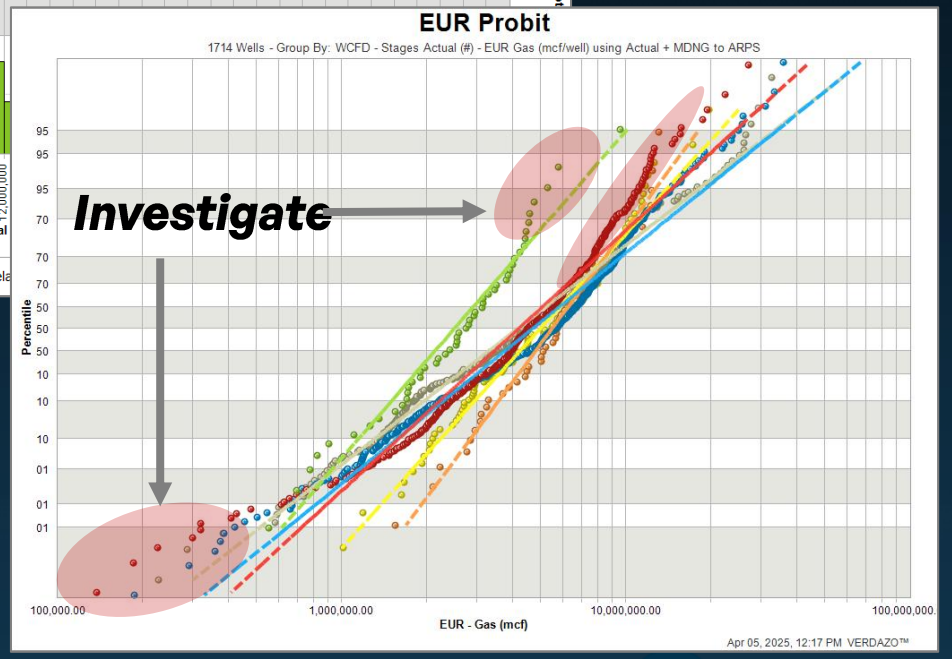
Goal

Include the greatest number of wells while ensuring they are representative.

Strategies / Considerations

- Inform with as much data as possible (Internal Data)
- Assess Fitness regularly
- Leverage multiple visualizations
- Investigate Outliers
- Leverage Dynamic Binning to gain further insights





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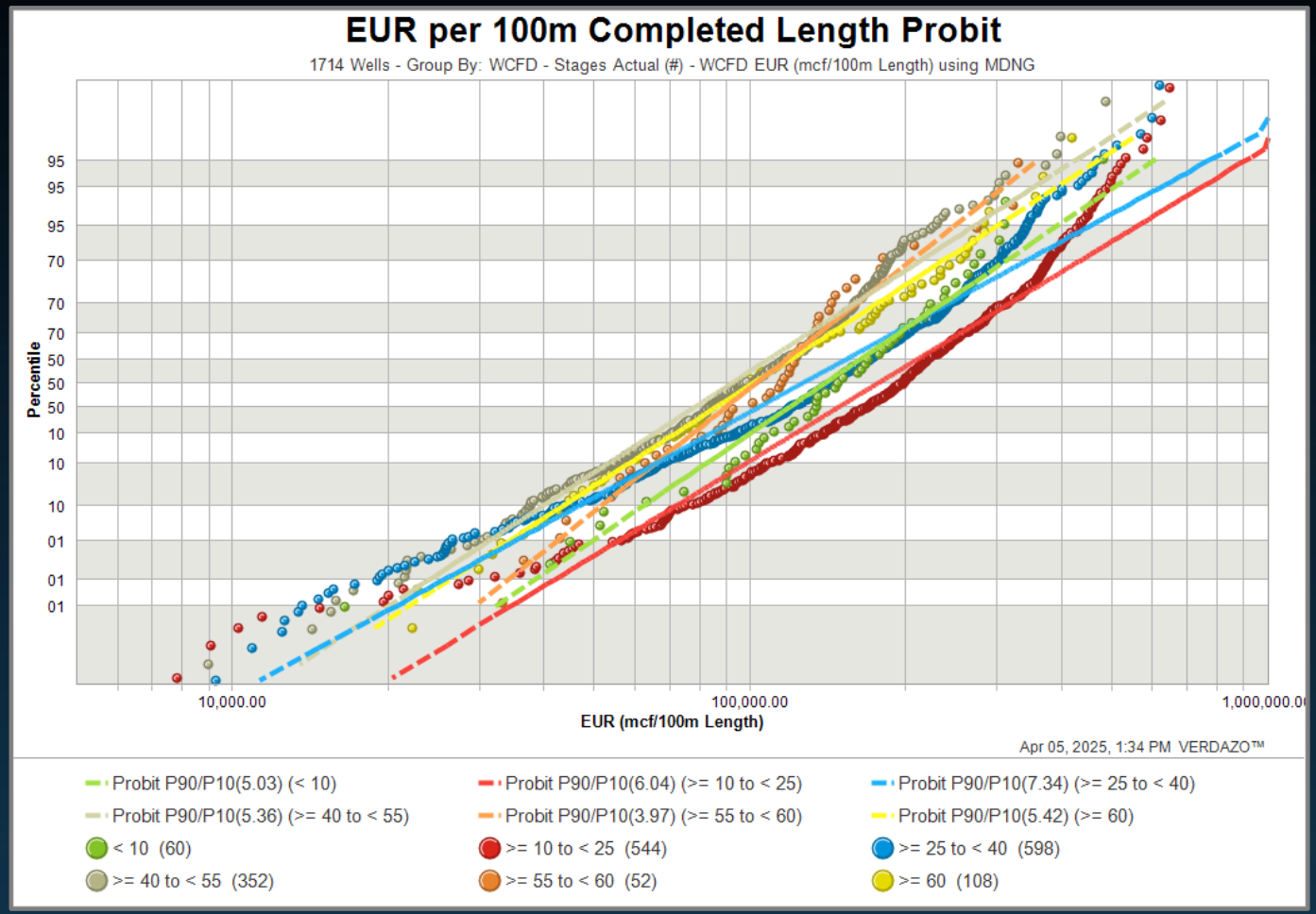
Bias Mitigation – Sample Size

Bias

Insufficient availability of Analogs results in statistically insufficient sample size.

Mitigation Strategies

- Sacrifice Representativeness
- ✓***Dimensional Normalization***
- ✓Understand the Determinants of Production Performance
- ✓Normalize by impactful Determinants
  - Leverage Internal Data



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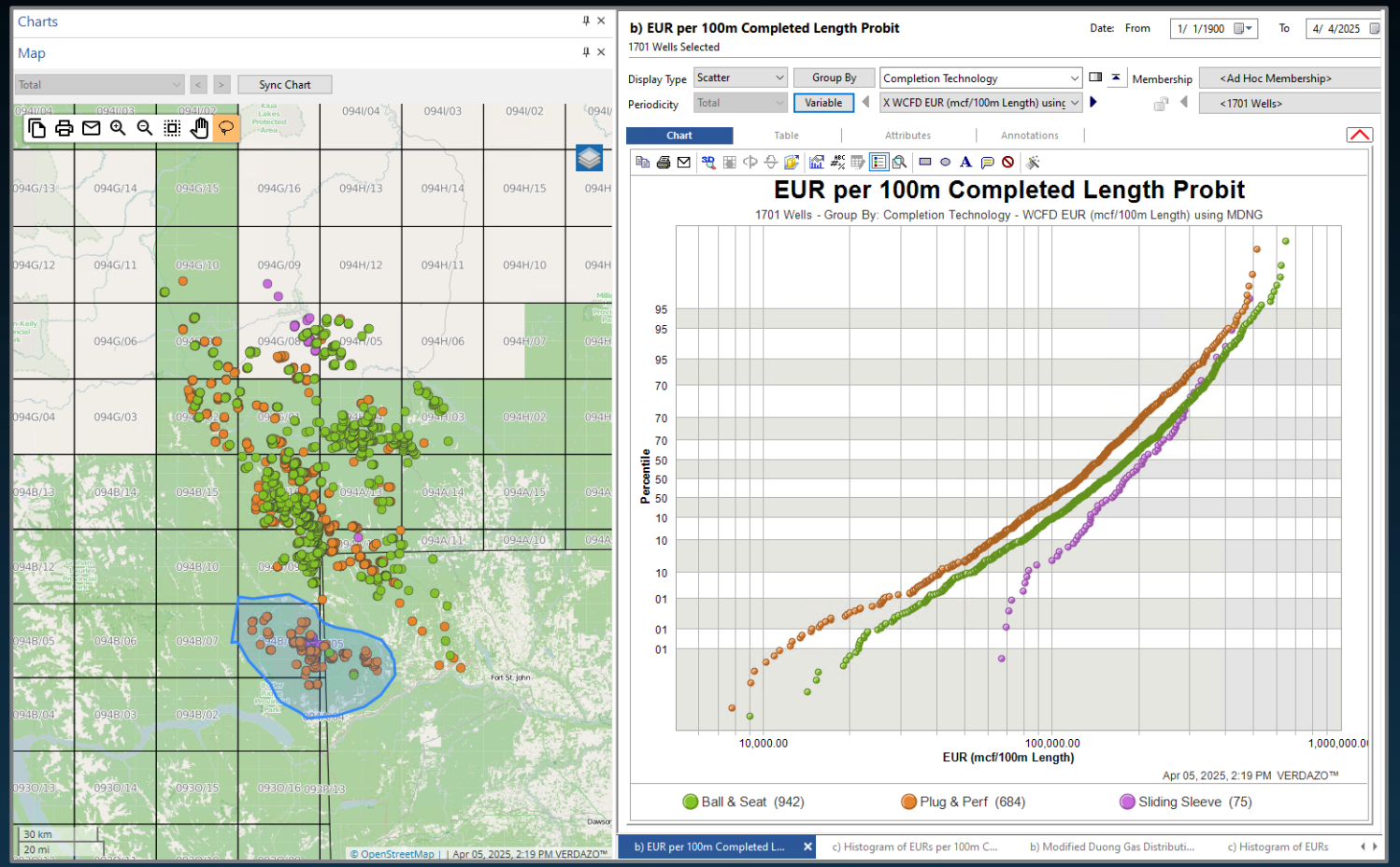
Bias Mitigation – Selection

Bias

Insufficient Production Determinant Data or unexpected differences lead to uninformed or inappropriate analog selection.

Mitigation Strategies

- Leverage all available data
- Leverage Proxy Indicators
- Requires dynamic analysis capabilities
- Proximity requires interactive mapping capabilities



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Determinants of Production Performance

Goal: Identify & Understand the most impactful influences on Production Performance

- Labour-intensive exercise without integrated data **&** dynamic analysis tools
- Internal data sources (e.g. geology, completions) can provide extremely valuable insights
- For fast results with a high degree of transparency, we recommend leveraging a Multi-Variate analysis workflow leveraging the concepts of Parallel Coordinates analysis
  - Details of this workflow can be found in ***SPE-185077-MS***

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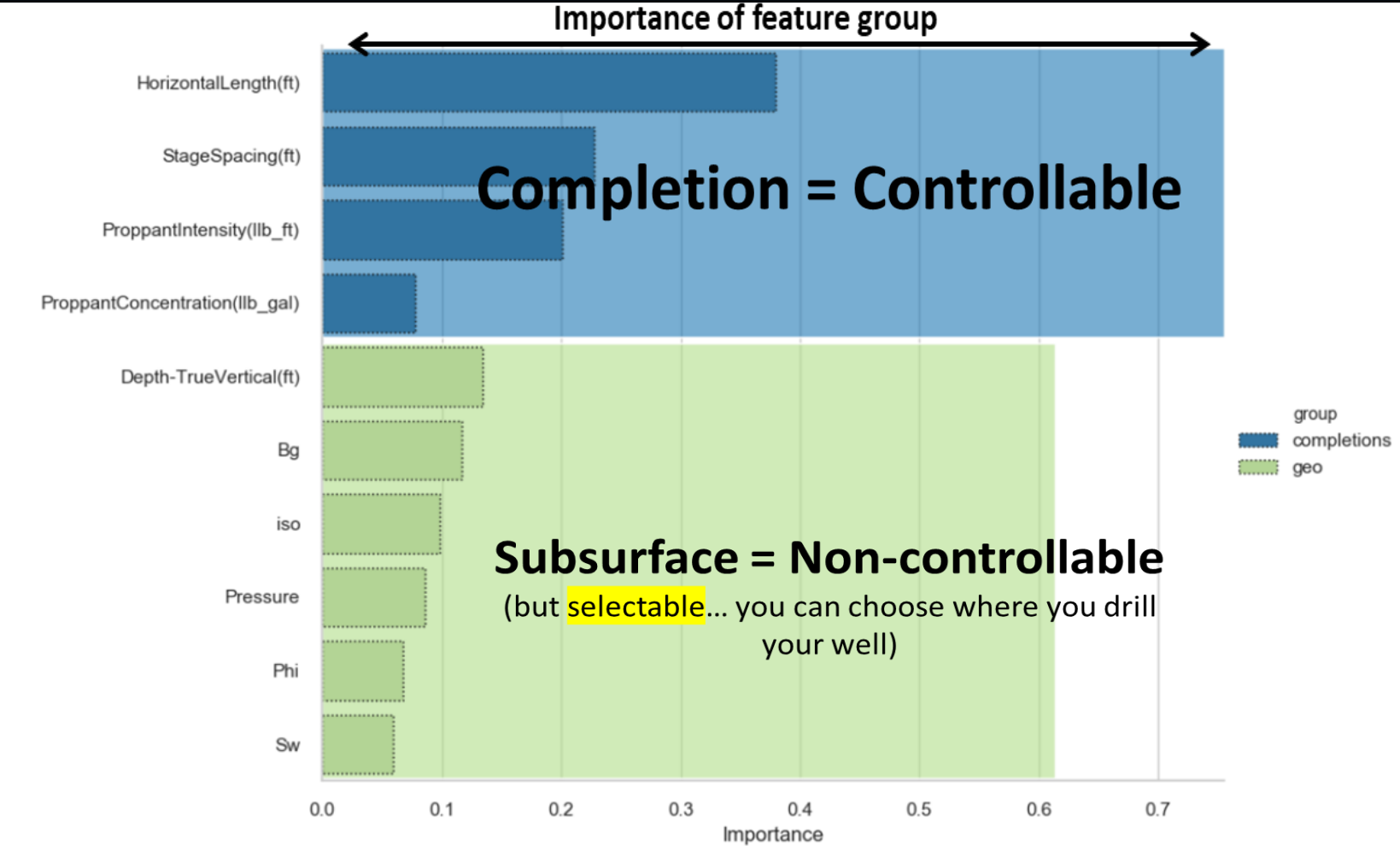
Determinants of Production Performance



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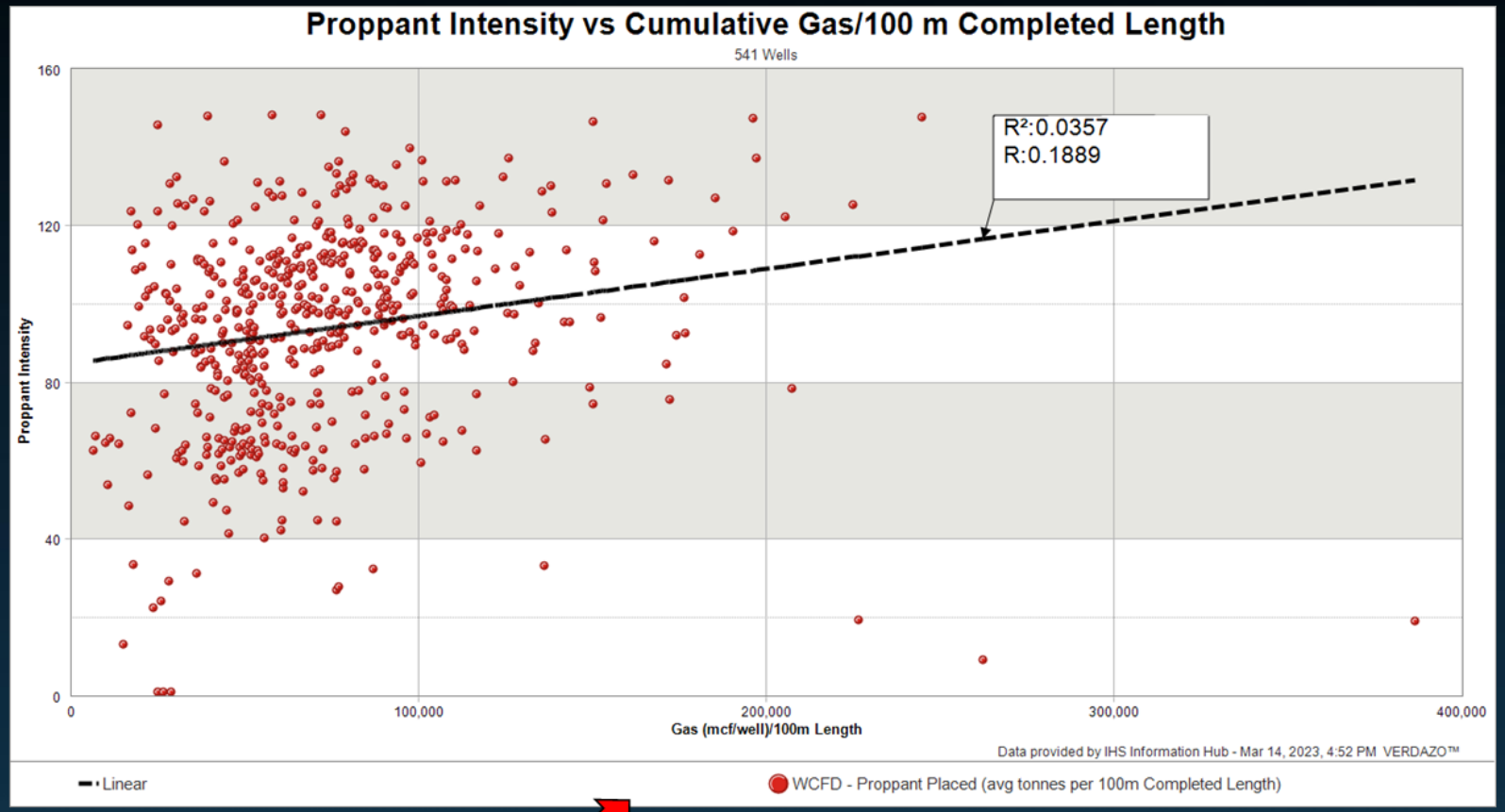
Determinants of Production Performance

Don't Rely on Correlations as a Measure of Importance.

Bin the data using a well design feature, (or geological feature)



Plot percentile of the production measure

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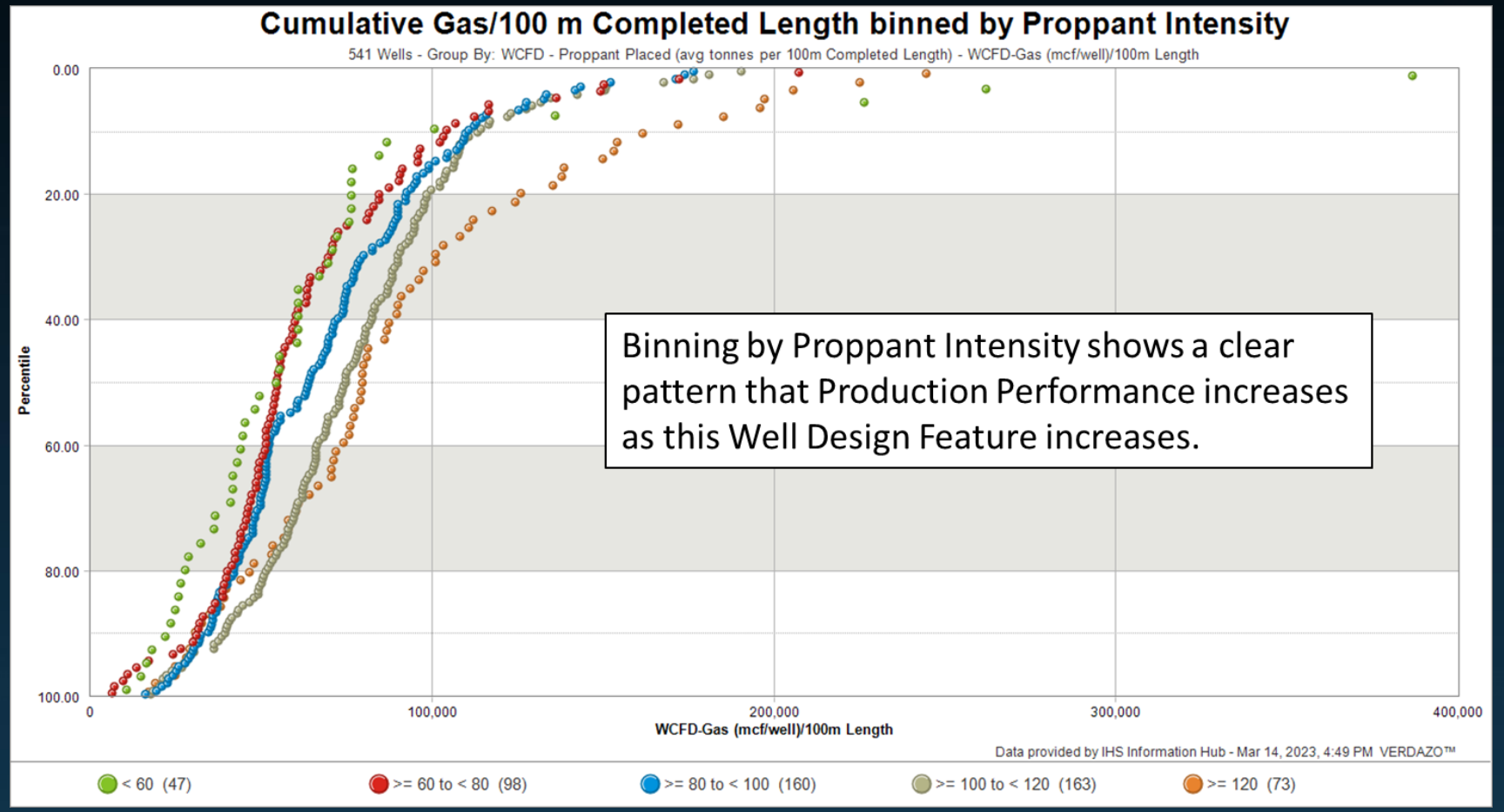
Determinants of Production Performance

SAME DATA AS PREVIOUS SLIDE



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Determinants of Production Performance

Purpose of Parallel Coordinates Distribution (PCD) Charts

- Identify the inputs that warrant investigation (i.e. to focus your efforts where it counts the most)
- Identify patterns that illustrate the concepts of thresholds and correlation windows
- Use patterns to determine target values used in analog selection and dimensional normalization
- Identify peculiarities in the patterns that may suggest the analogue is not well defined and subsets should be investigated

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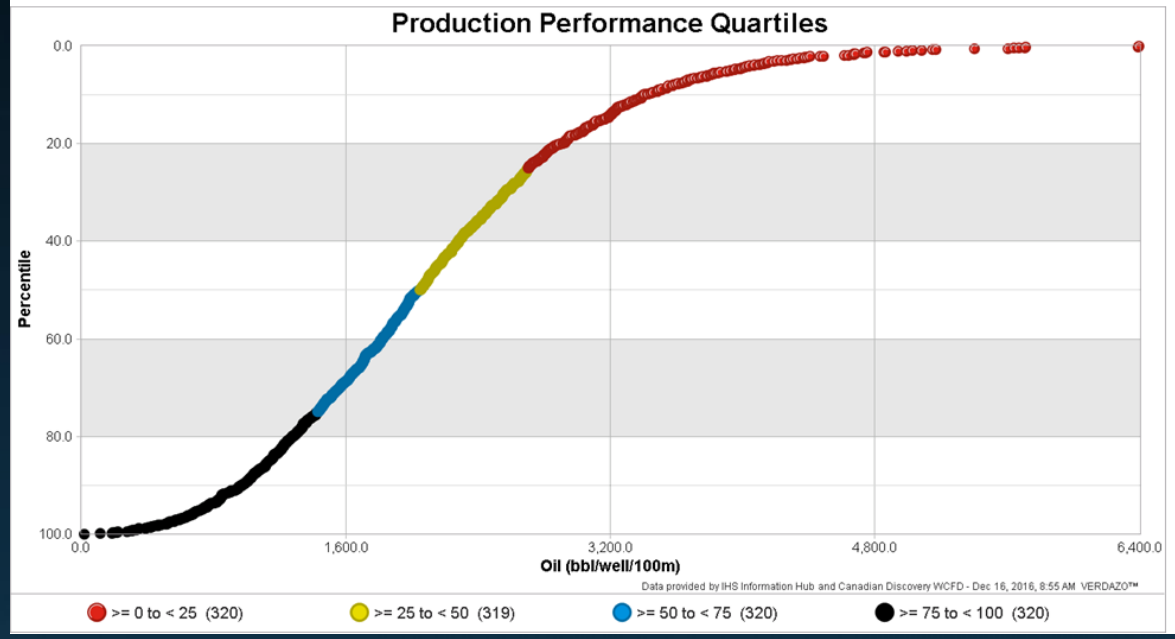
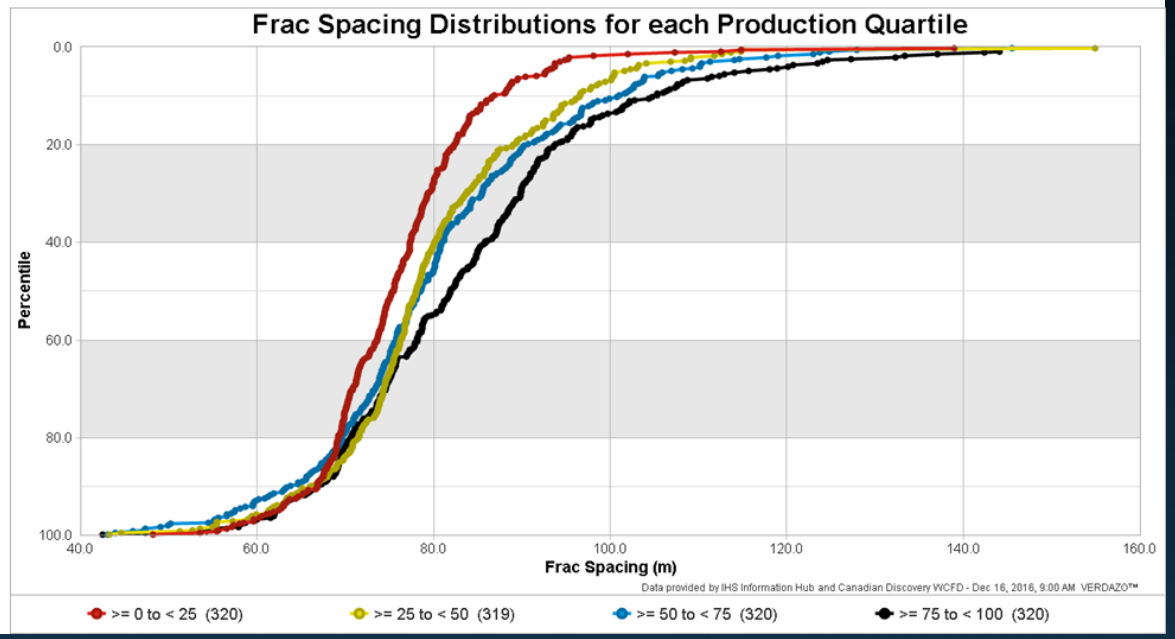
Parallel Coordinates Distribution Charts

Production Performance Quartiles → Production Performance Quartile Grouping → Feature Data





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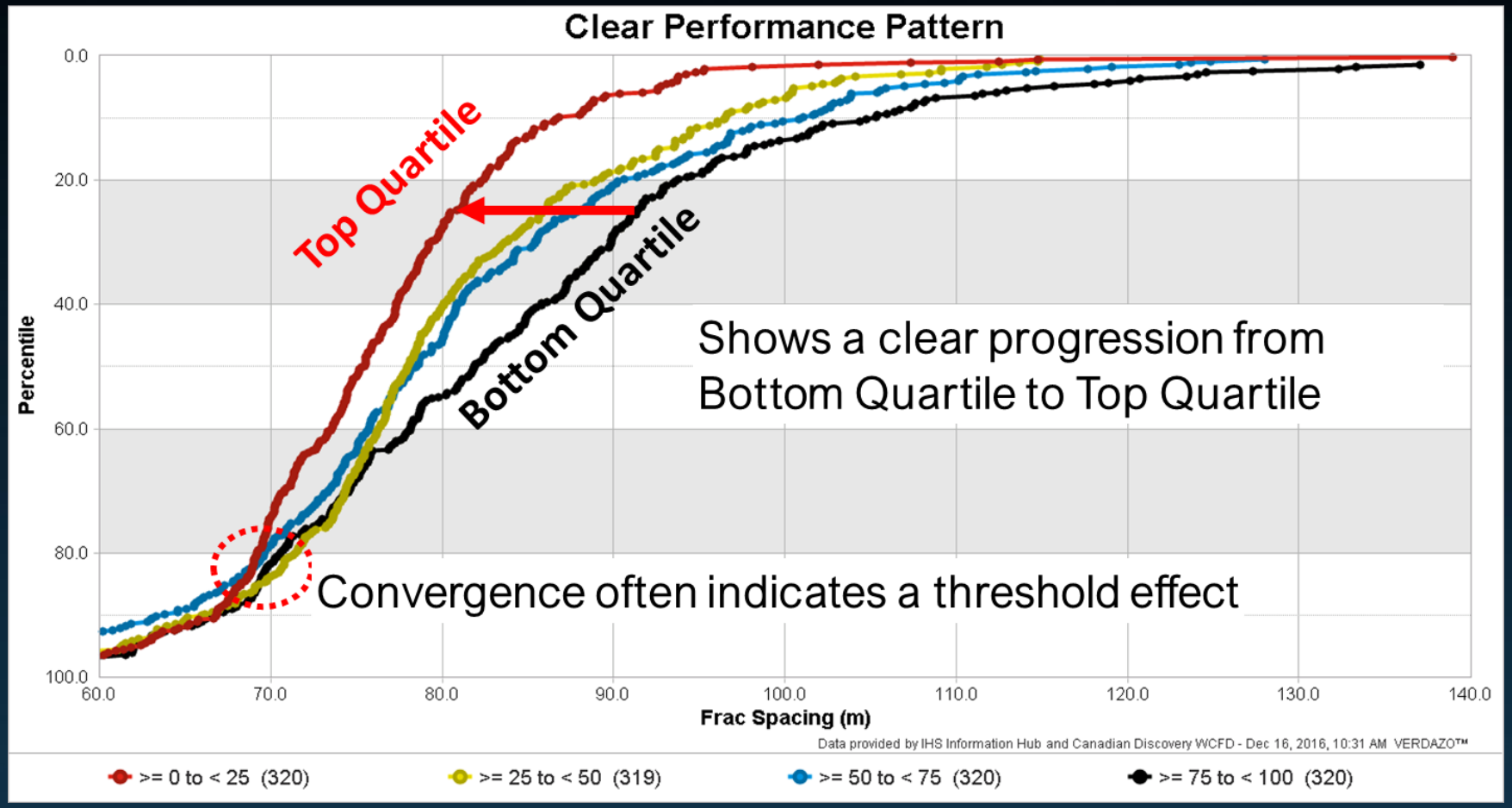
PCD Chart Patterns: Clear Performance Pattern



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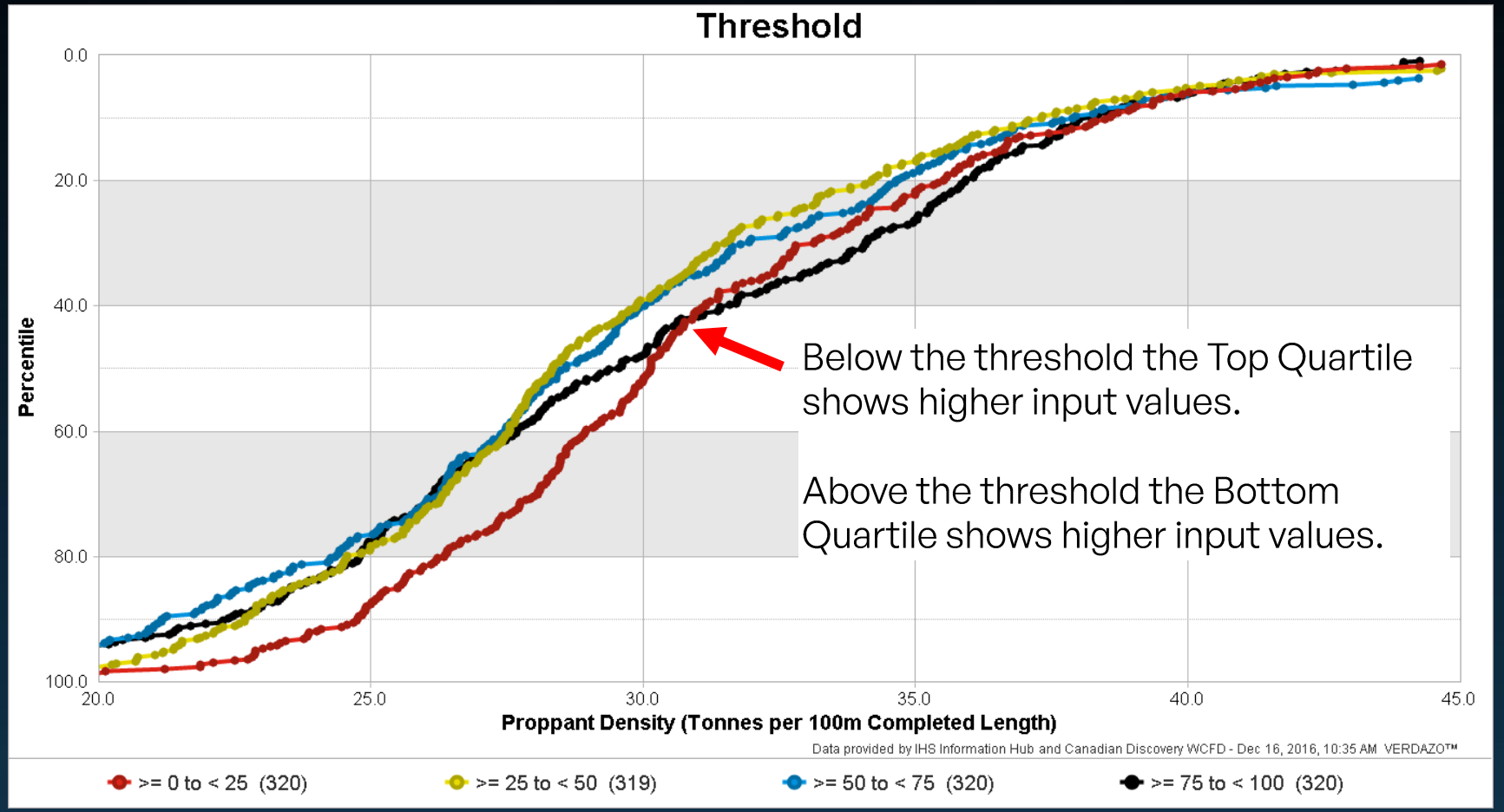
PCD Chart Patterns: Threshold



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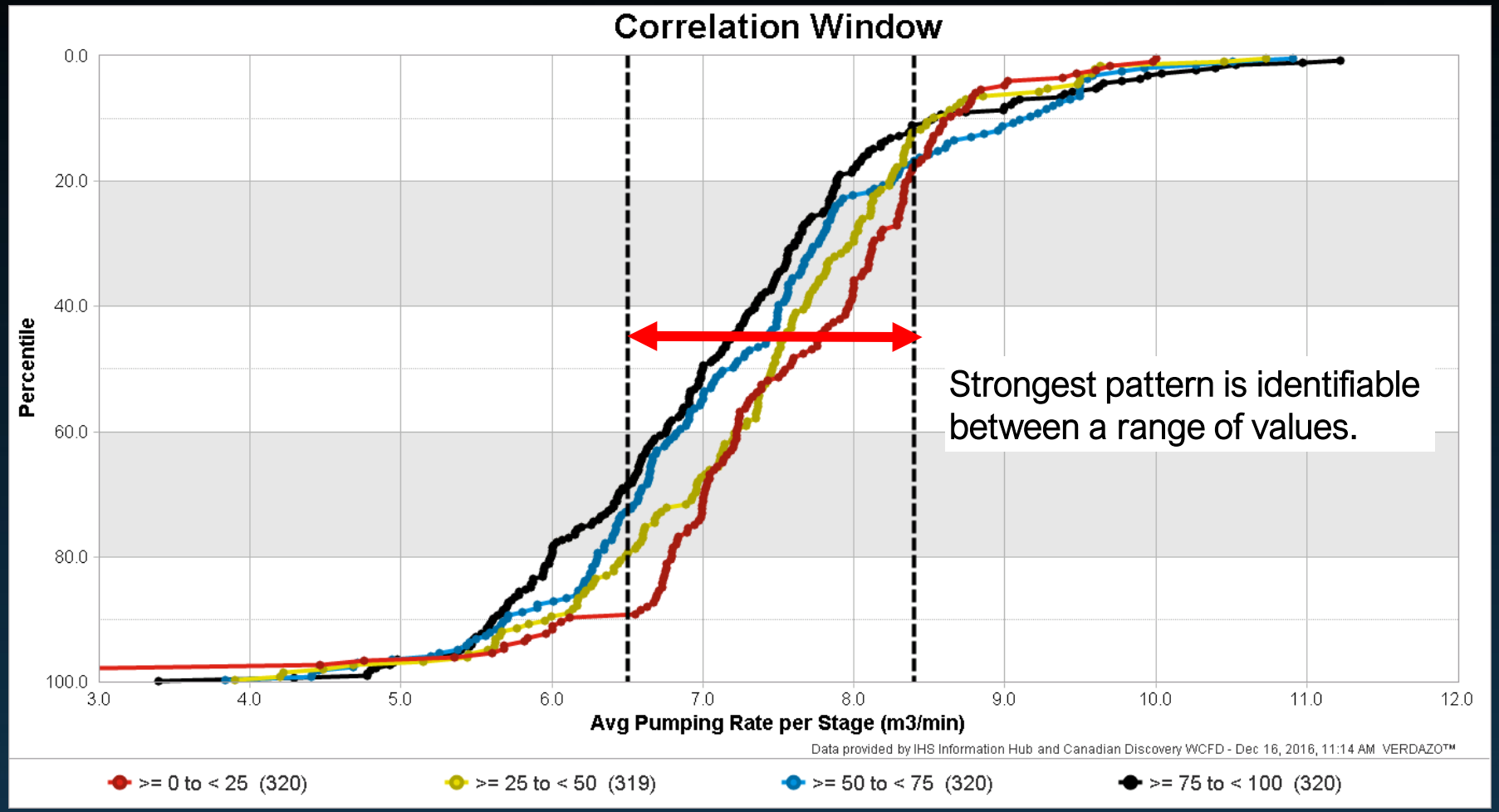
PCD Chart Patterns: Correlation Window



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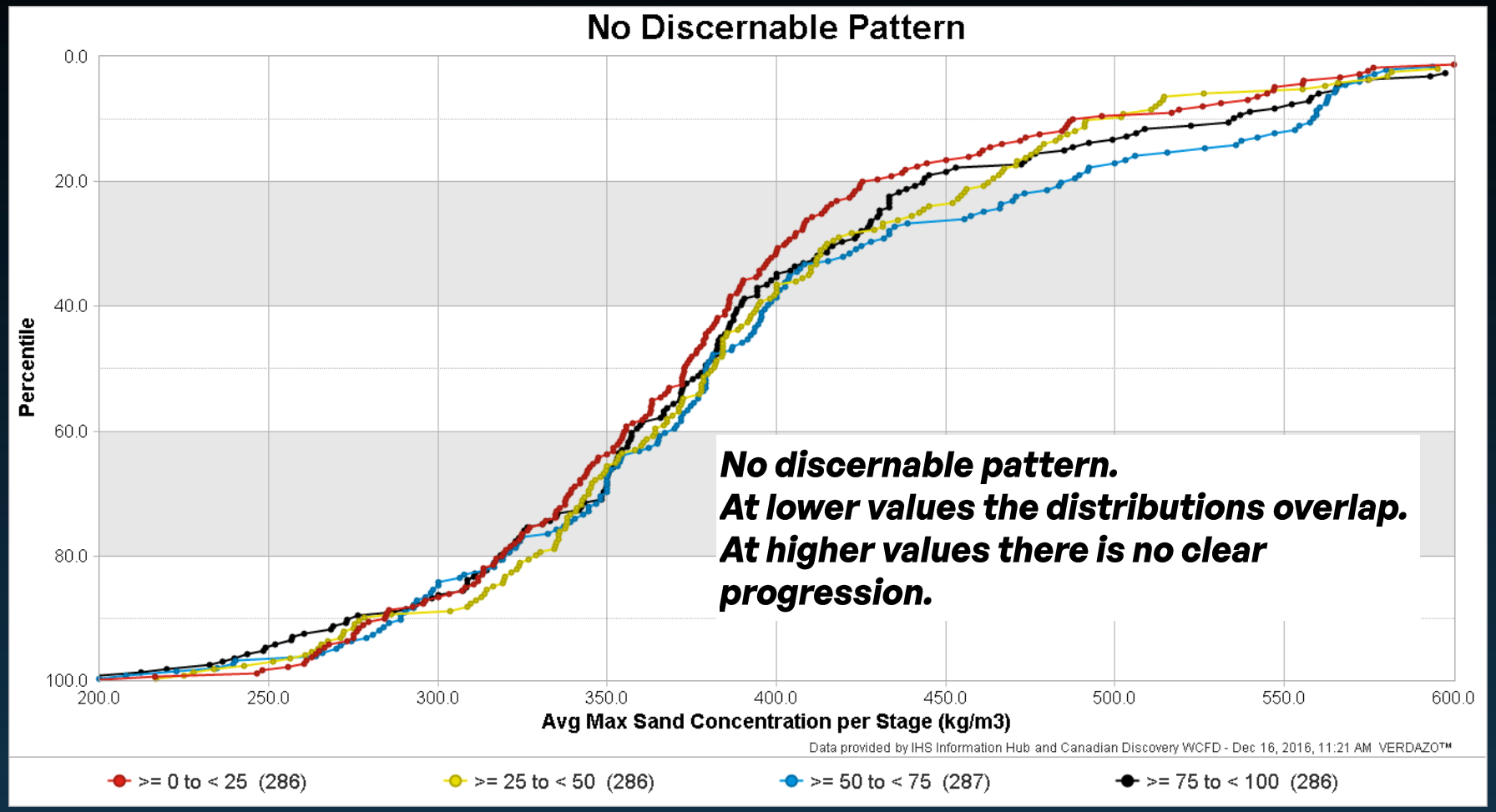
PCD Chart Patterns: No Discernable Pattern



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Transparency, Repeatability & Hindcasting

Essential for Reliable and Evolving Type Well Profiles.

Transparency enabled by Technology:

- Document analog selection criteria, inputs, and assumptions for clarity and auditability.

Repeatability enabled by Transparency:

- Clear documentation allows efficient reproduction and refinement of Type Well Profiles.

Hindcasting enabled by Integrated Data:

- Incorporate actual production data from Field Data Capture systems to validate and improve forecasts over time.

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AI in Reserves: Promise & Practical Realities

Promise: Accelerates analysis & pattern detection

Reality: Needs high-quality, contextual data & expert judgement

Challenges:

- Complex Data Landscape
- Domain Expertise Gap
- Data Quality Issues
- Bias & Uncertainty
- Explainability, Repeatability & Trust

Today's Role: Data prep, enrichment & bias detection – not automation

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Evolving Role of Data Management and Data Analytics in Reserves

Recap

How much data and how valuable is it?

Progression of Data Management & Analytics

Putting this Data & Technology to use

- Improved Forecasts & Reduced Uncertainty
- Transparency & Repeatability

AI's Promise & Reality

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Concluding Remarks:

- Data growth brings new opportunities, and new challenges.
- Integrated, high-quality data is key to confident, transparent reserves evaluation.
- Modern pipelines and discovery analytics enable agile, repeatable workflows (E.g. Parallel Coordinates Analysis).
- AI supports data enrichment, but expert judgment remains essential.
- The future is dynamic: embrace technology, transparency, and collaboration.

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References

References

- IDC. “Data Age 2025: The Digitization of the World From Edge to Core.” International Data Corporation, 2018.(Global data growth and zettabyte/exabyte statistics)
- Oil & Gas Journal. “Big Data in Oil & Gas: Industry Generates 2–3 Exabytes per Day.” Oil & Gas Journal, 2023.(Industry data volume estimates)
- S&P Global. “Data Volumes Now Exceeding 10 TB per Day for a Single Well.” S&P Global Insights, 2024.(Well-level data generation quote)
- Society of Petroleum Engineers. “SPE-185077-MS: Parallel Coordinates Distribution Analysis for Unconventional Resource Evaluation.” SPE Annual Technical Conference and Exhibition, 2017.(Technical reference for PCD methodology)
- Society of Petroleum Evaluation Engineers. “Monograph 5: Recommended Practices for Type Well Profile Development.” SPEE, 2023.(Best practices for TWP and bias mitigation)

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Additional Information

VERDAZO can help you quickly realize the value of the best practices discussed in this presentation through the implementation of Data Pipelines & Discovery Analytics built specifically for Oil & Gas.

Please contact Omnira to discuss further, we'd love to hear from you!

sales@omnirasoftware.com

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