UT Energy Week 2018
Panel 2: Innovation in Oil & Gas: Impacts of Digitalization on Operations

Technology & Big Data in Unconventional Oil & Gas Development

James Courtier
Vice President Exploration

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This presentation (which includes oral statements made in connection with this presentation) may contain forward-looking statements with respect to Laredo Petroleum, Inc. (the "Company", "Laredo" or "LPI") within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934.

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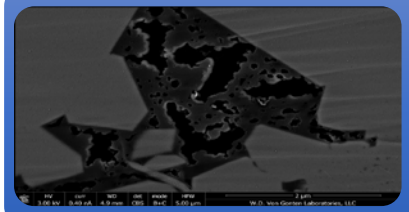
Technology & Big Data Outline

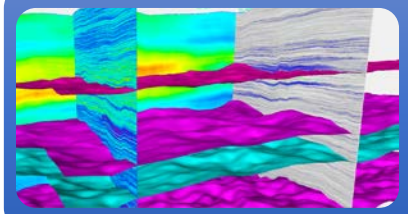
- Massive quantities of data being generated
- Physics-based technical assessments remain essential
- Why “Big Data Analytics” is rapidly gaining momentum
- Macro industry insights
- Future for new industry entrants

What and where is the data?



Initial Subsurface Data Sets

- Cores
- Logs
- Seismic



Subsurface Characterization & Modeling

- High resolution 3D models
- Reservoir, mechanical and fracturing properties
- Hydraulic fractures, reservoir simulation & studies

Operations

- Drilling & Completions
- Real-time instrumentation data
- Pressure pumping data

Production

- Metered production data
- Downhole pressure data

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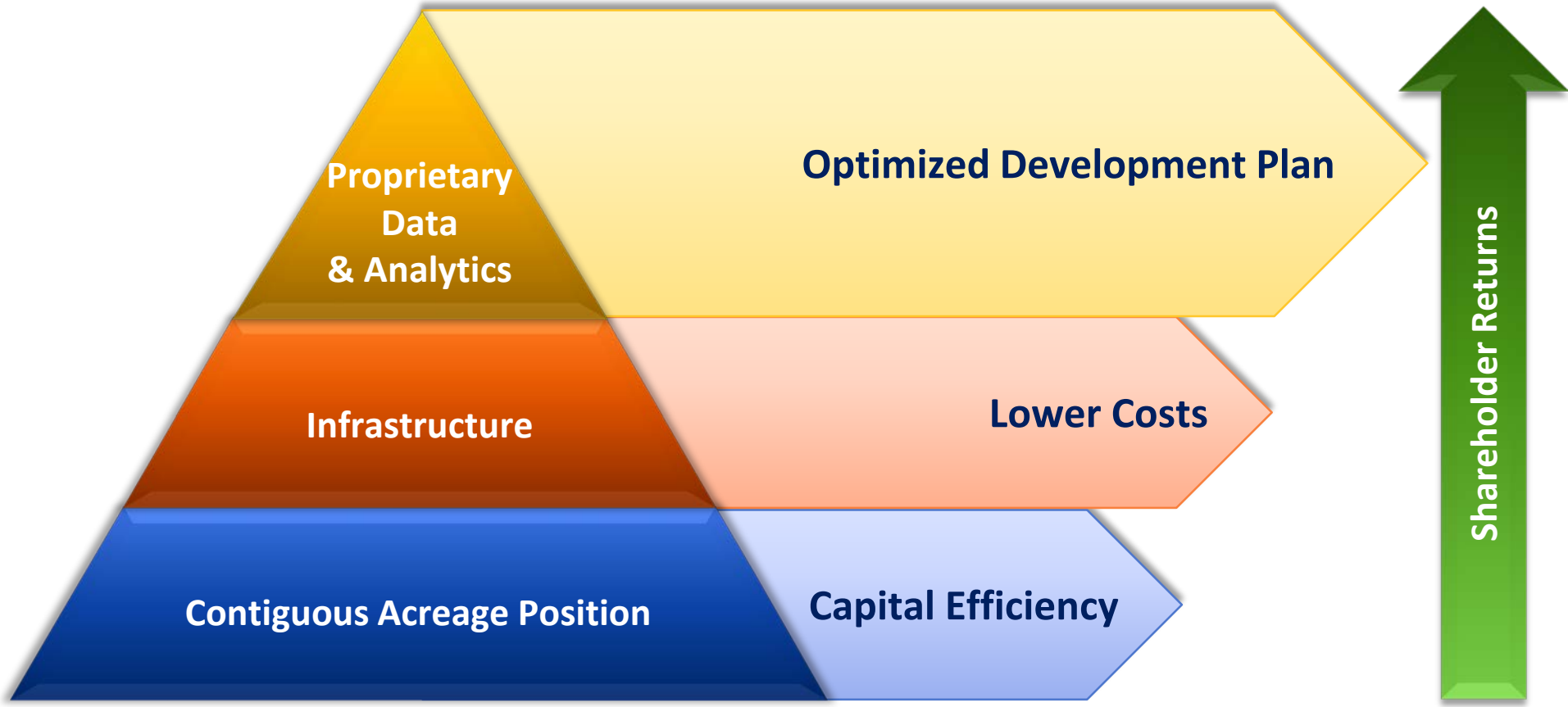
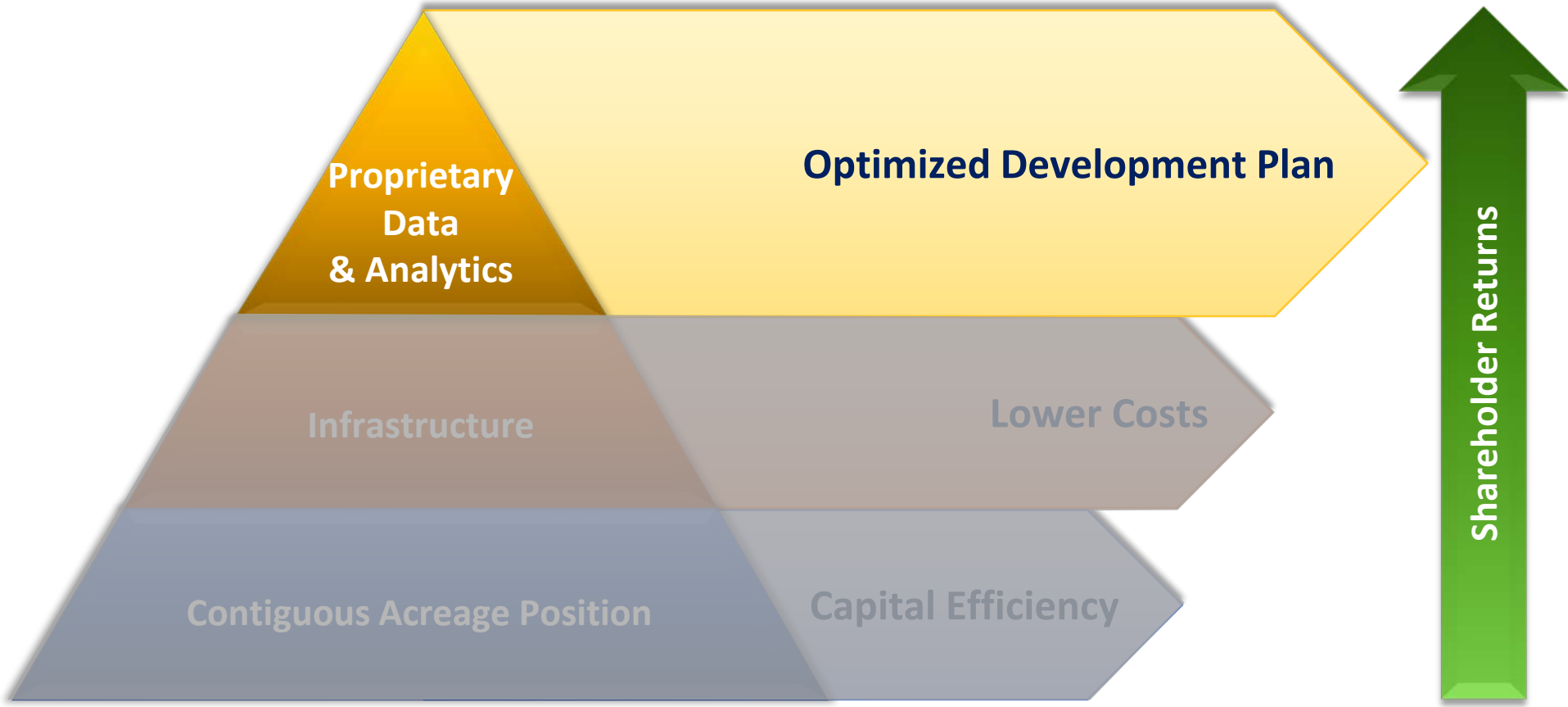
Massive quantities of data being generated across entire value-chain

Steady, Strategic Plan Yields Repeatable Results



A disciplined focus on key value drivers since inception has driven shareholder returns

Steady, Strategic Plan Yields Repeatable Results



Today's talk focuses on how data & analytics assist an unconventional oil company during development

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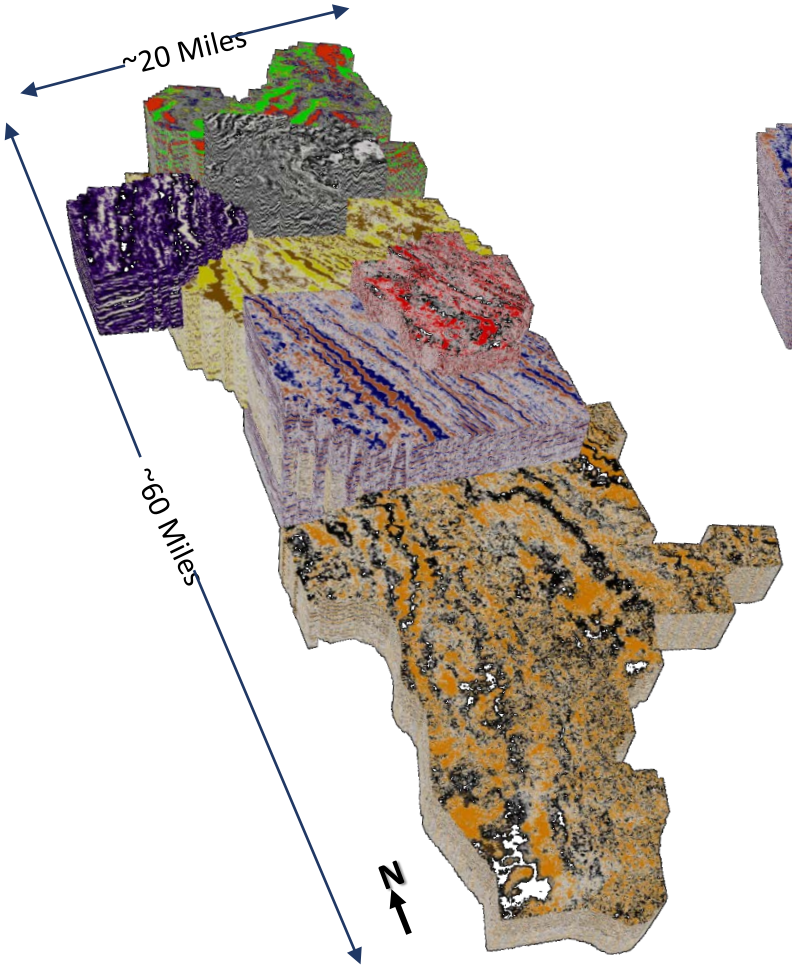
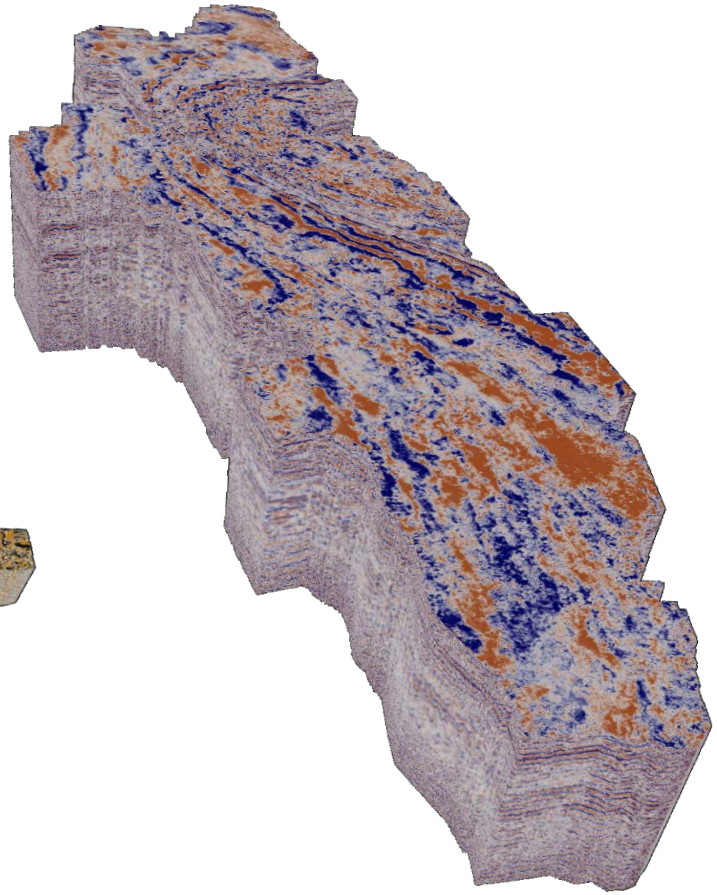
Improving & Integrating Existing Data

9 Individual 3D surveys



2018 MegaMerge



Reprocessed 3D seismic dataset exhibits substantial imaging improvements

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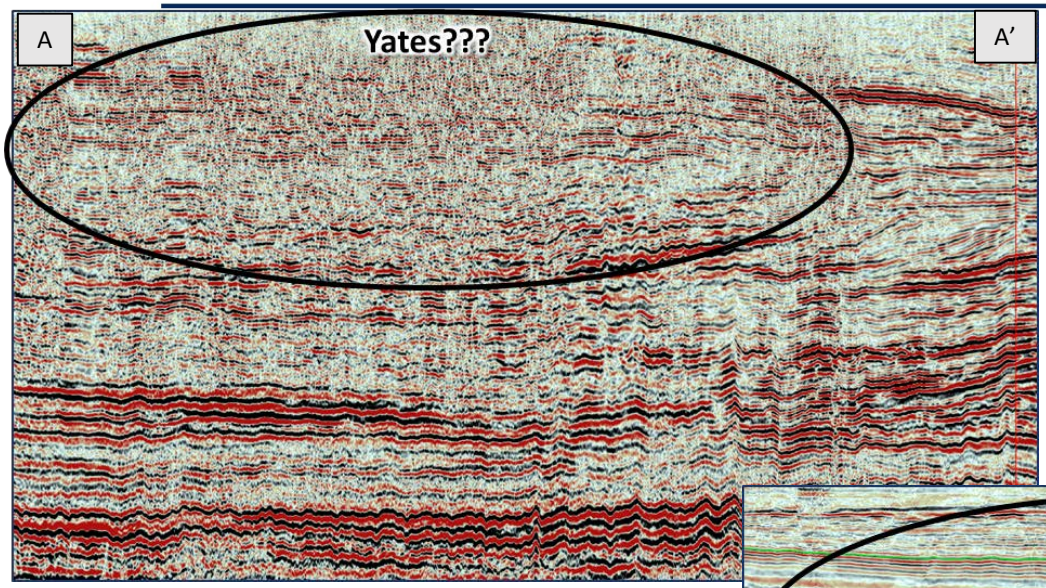
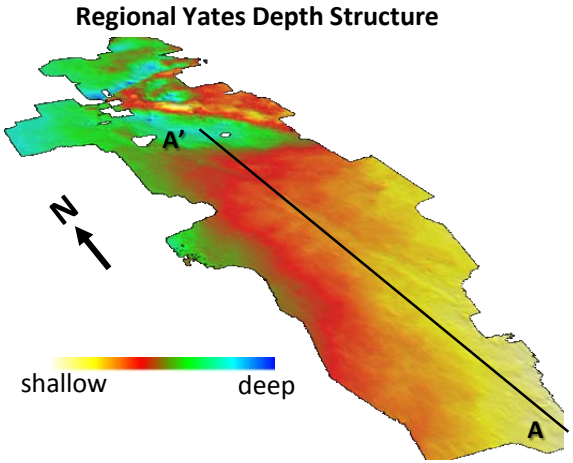
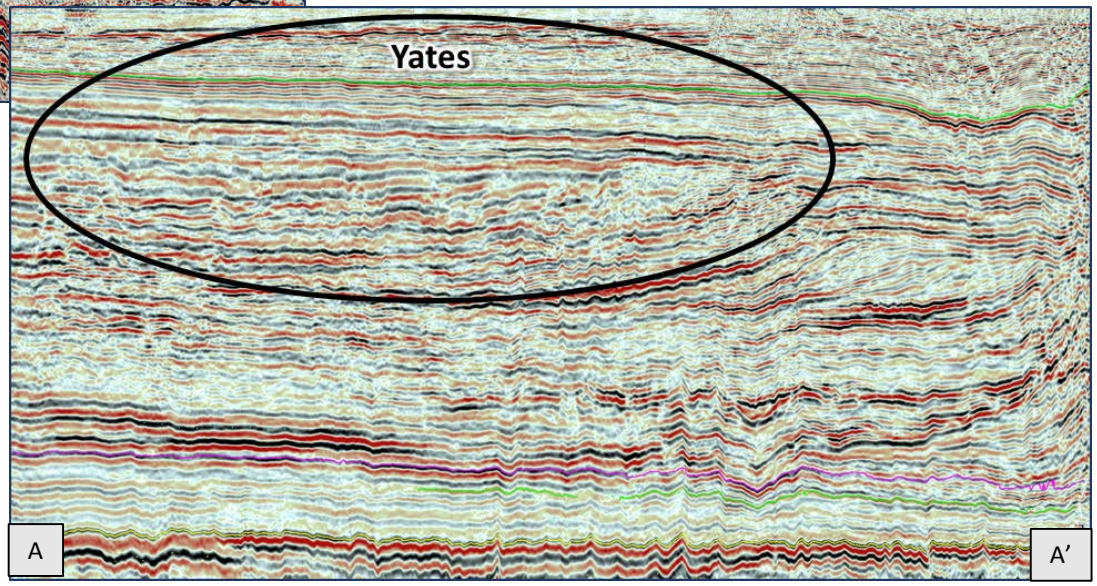
MegaMerge Processing Improvements



Improvements in image clarity, continuity & depth accuracy





Improving existing data sets adds tremendous value at low cost

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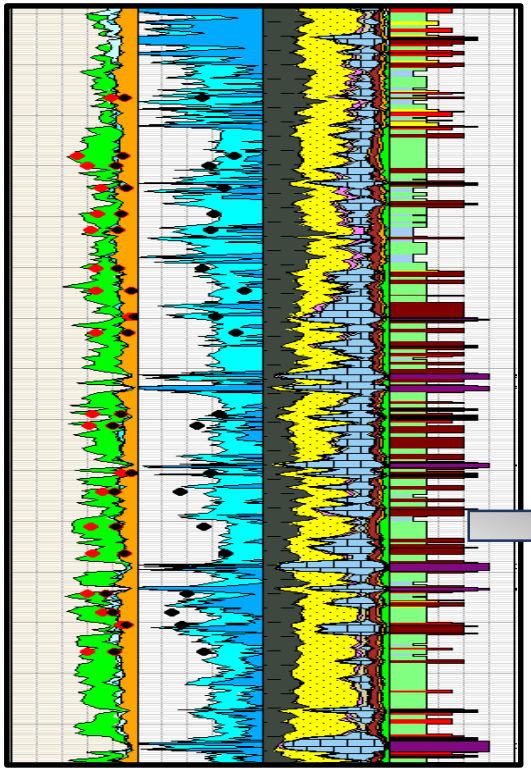
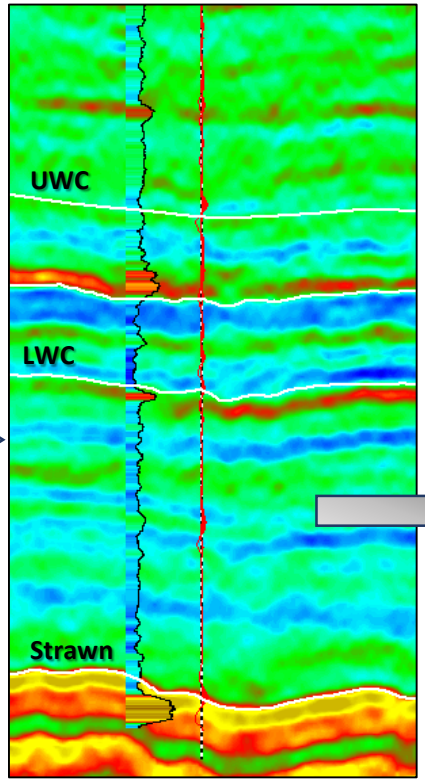
High-Resolution 3D Geomodel Reservoir Characterization

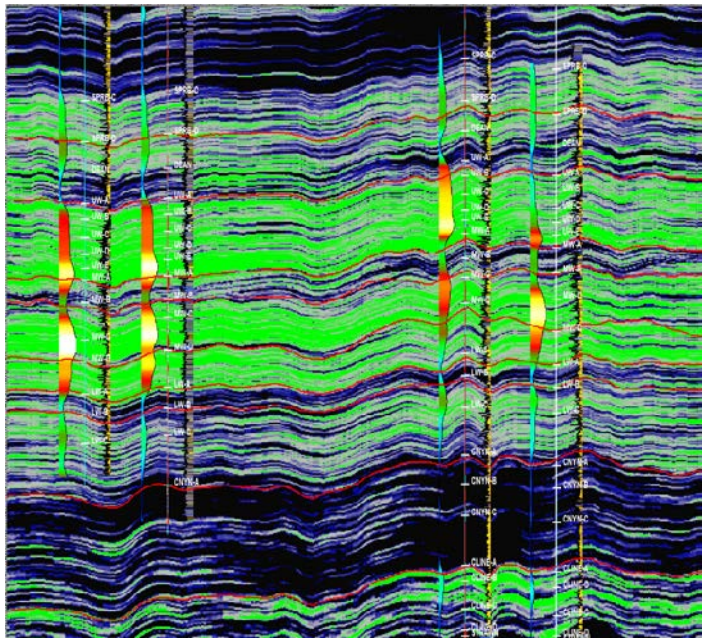
Improved Petrophysical Model



Improved Inversion Products



Improved High-Resolution Facies & Rock Property Volumes



High quality inputs improve 3D reservoir characterization

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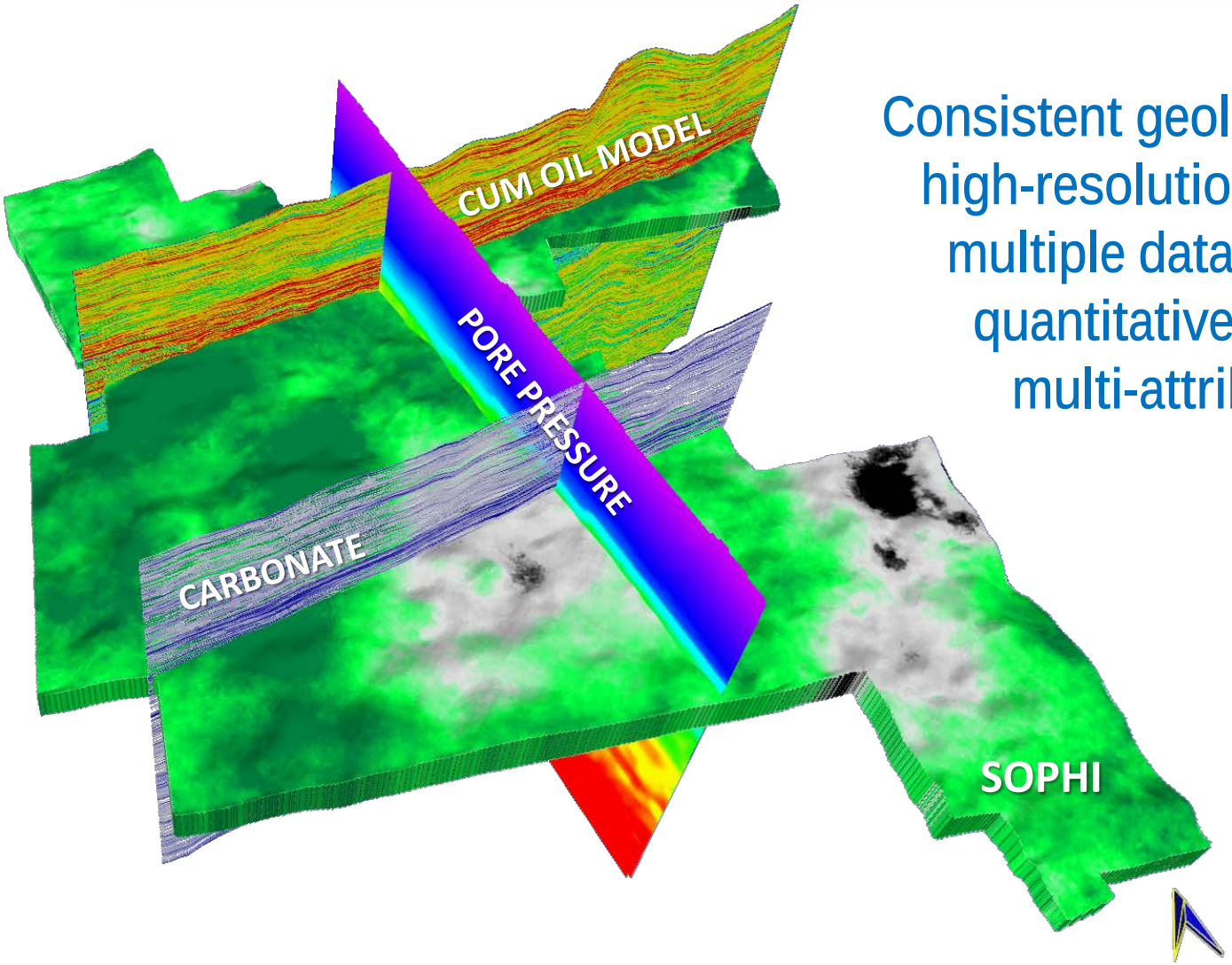
High-Resolution 3D Geomodel Overview



Consistent geological framework
high-resolution
multiple data type inputs
quantitative
multi-attribute outputs

Integrating data within geomodels greatly improves development planning toolkit

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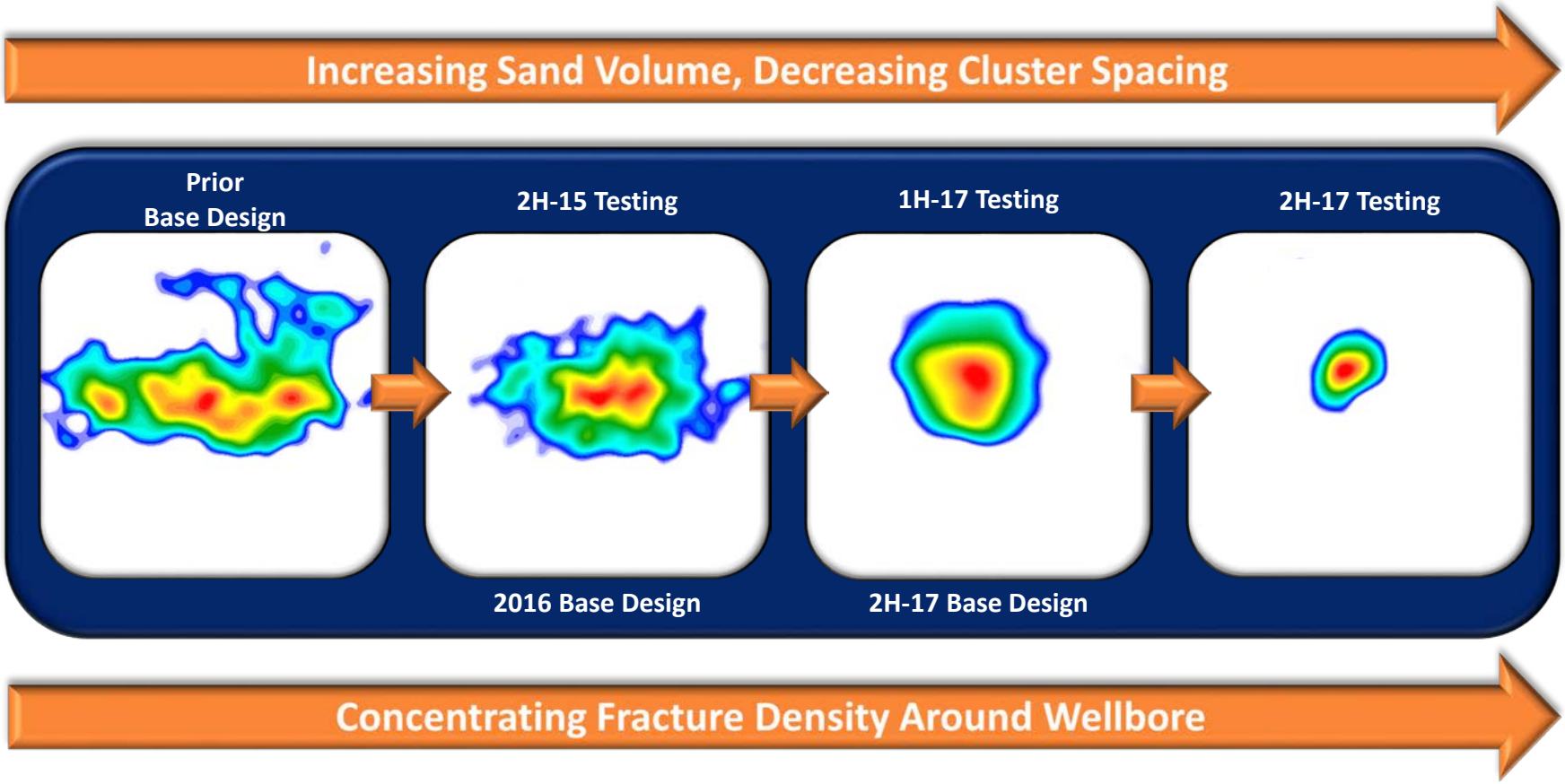
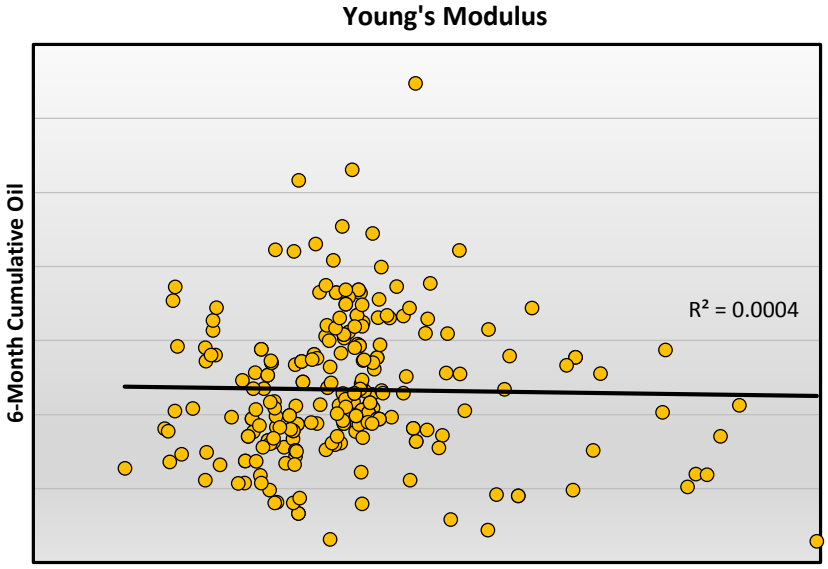
Internal Models Accelerate Completions Design Evolution

Proprietary workflows are shortening time from concept to field implementation, enabling continual optimization of completions designs

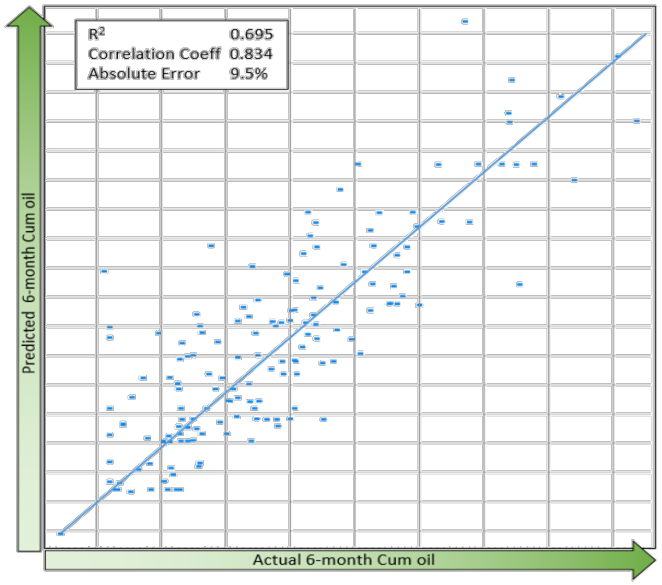


Why “Big Data Analytics”?

Bivariate Example: Impact of 1 parameter



Multivariate Example: Impact of 9 parameters



Patterns may not emerge in bivariate studies - necessitating a multivariate approach

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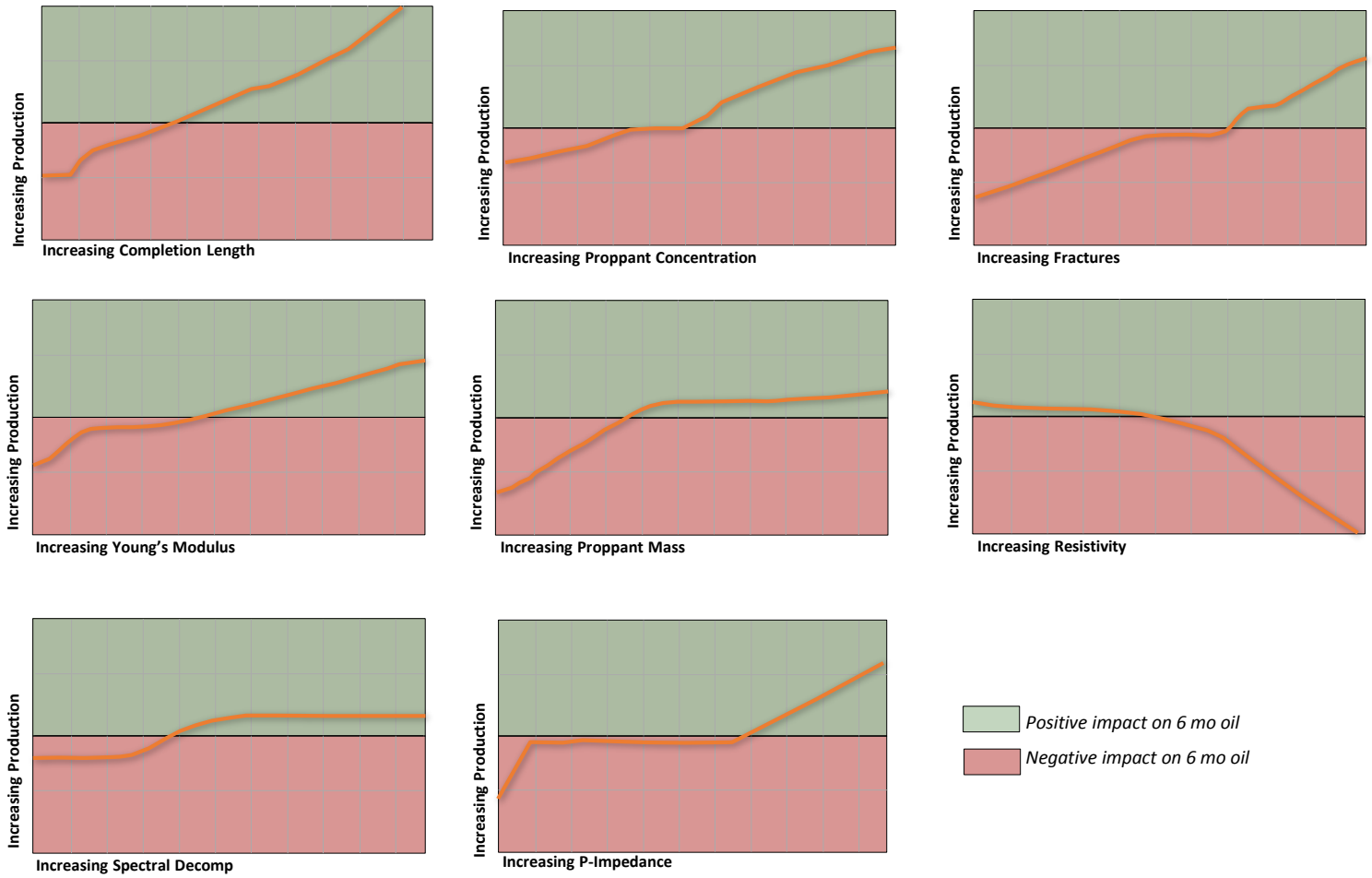
Fundamental Insights from Multivariate Analytics



Algorithms detect individual parameters that impact value drivers (e.g. oil production) and their significance

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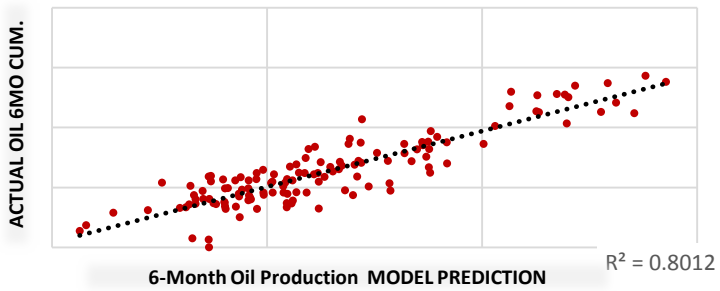
Multivariate Analytics: 3D BO/ft Predictions

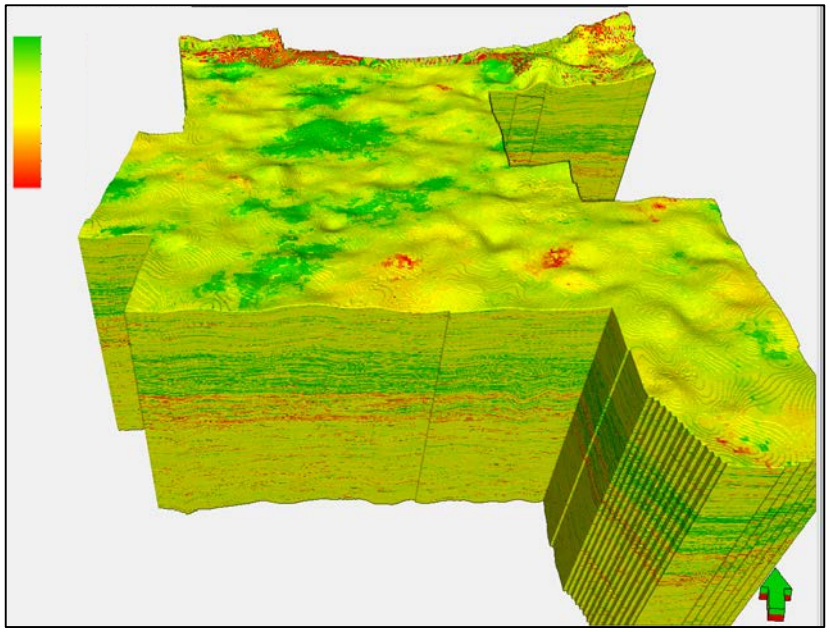
45 Input Variables Examined

- Engineering Variables (7)
- Acoustic Properties (6)
- Petrophyiscal Parameters (13)
- Lithology Indicators (9)
- Oil Storage Attributes (6)
- Structural Attributes (3)
- Pore Pressure

Multivariate 3D Bo/ft. Solution

- Completed Lateral Length
- Parent-Child Tangent Distance
- Completion Parameter #1
- Completion Parameter #2
- Production Parameter
- Geological Parameter #1
- Geological Parameter #2
- Geological Parameter #3
- Geological Parameter #4
- Geological Parameter #5





Key engineering & geoscience production drivers are detected amongst multiple input parameters

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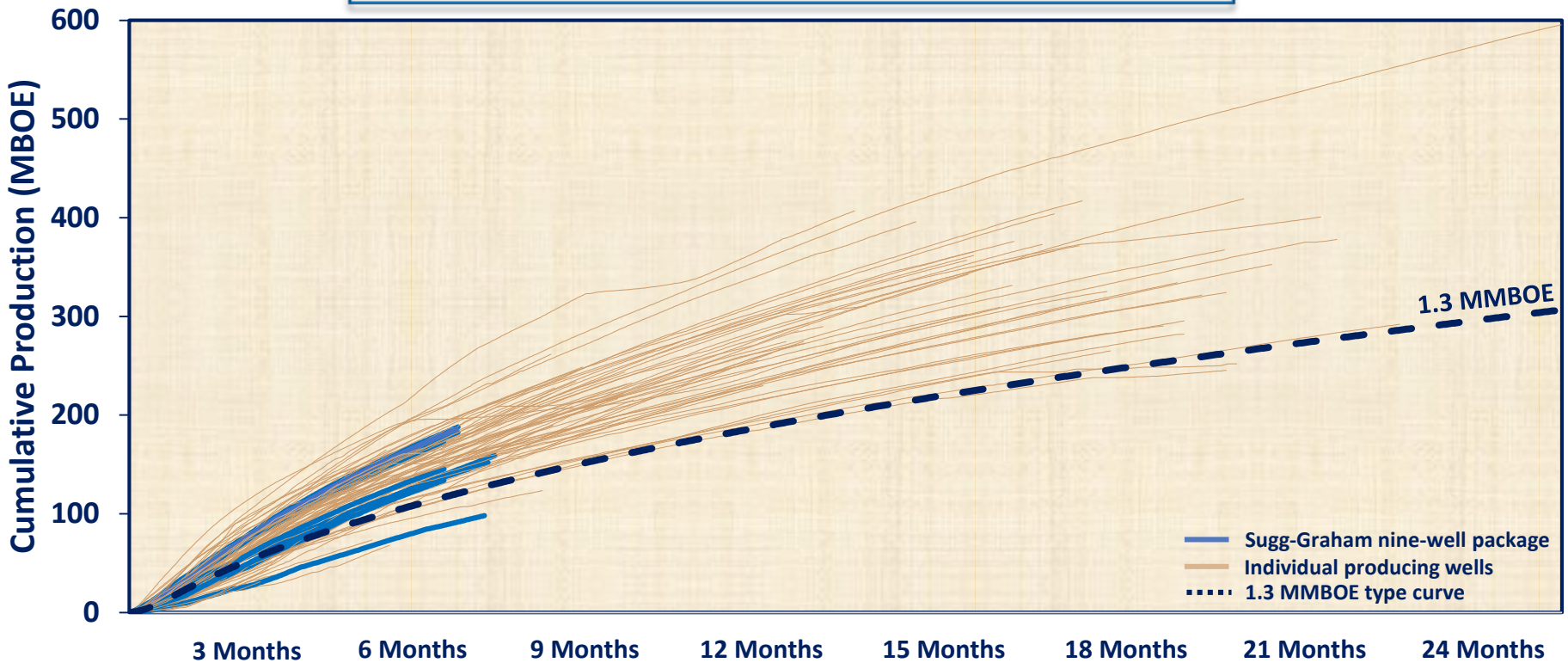
Sugg-Graham Nine-Well Package Performing vs. Type Curve

Wells drilled with tighter spacing are exceeding type curve expectations



~36% Outperformance of all 96 wells to 1.3 MMBOE type curve

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Note: Production has been scaled to 10,000' EUR type curves and non-producing days (for shut-ins) have been removed
Average cumulative production data through 10/25/2017. This includes 96 Hz UWC/MWC & Cline wells that have utilized optimized completions with avg. ~1,900 pounds of sand per lateral foot. Type curve utilizes a weighted-average of 89 Hz UWC/MWC 1.3 MMBOE wells & 7 Hz Cline 1.0 MMBOE wells

Summary of "Big Data" Utilized in Machine Learning Project

LPI Proprietary Data

320+ LPI Hz Wells

120 Subsurface attributes

Multi-year drill schedule

Detailed well economics

Direction surveys

Detailed completions

Daily production

Well-spacing distances

Subscription Data

15,000 OBO Permian Hz Wells
Public well economics
Directional surveys
Daily production
Public completions details
Public well spacing details

Organized Database

Over 15 million unique attributes accessed via machine-learning to quantify dominant economic drivers

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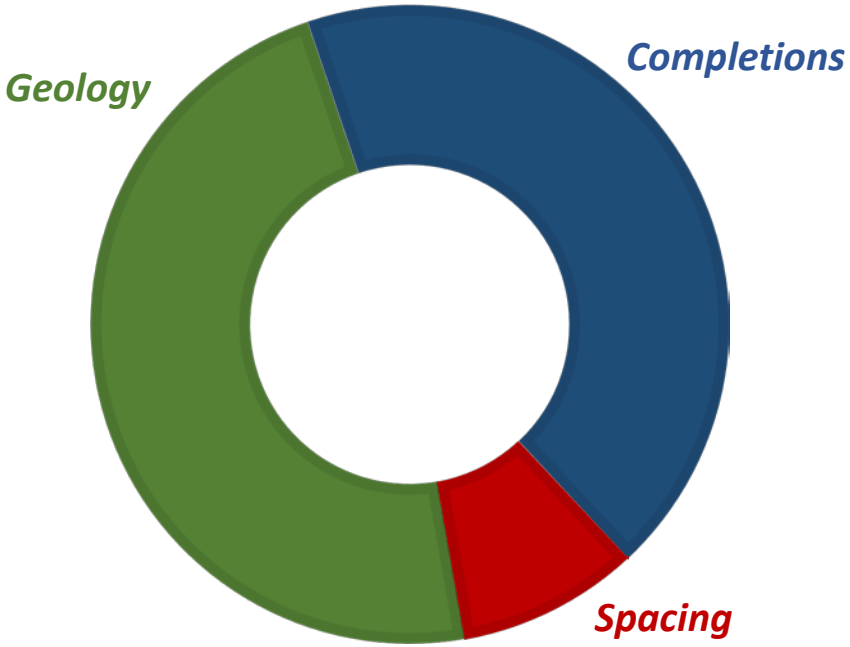
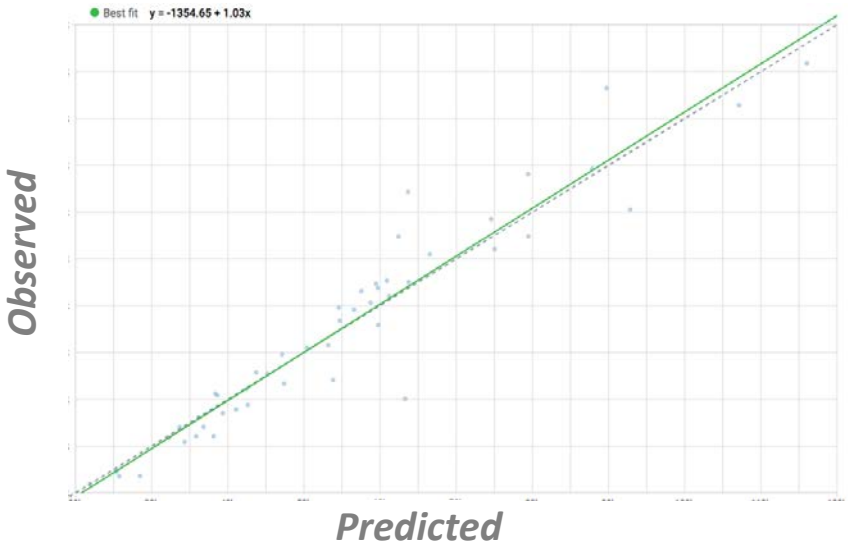
Machine Learning Example: Solving For Production

Constituent Model Parameters



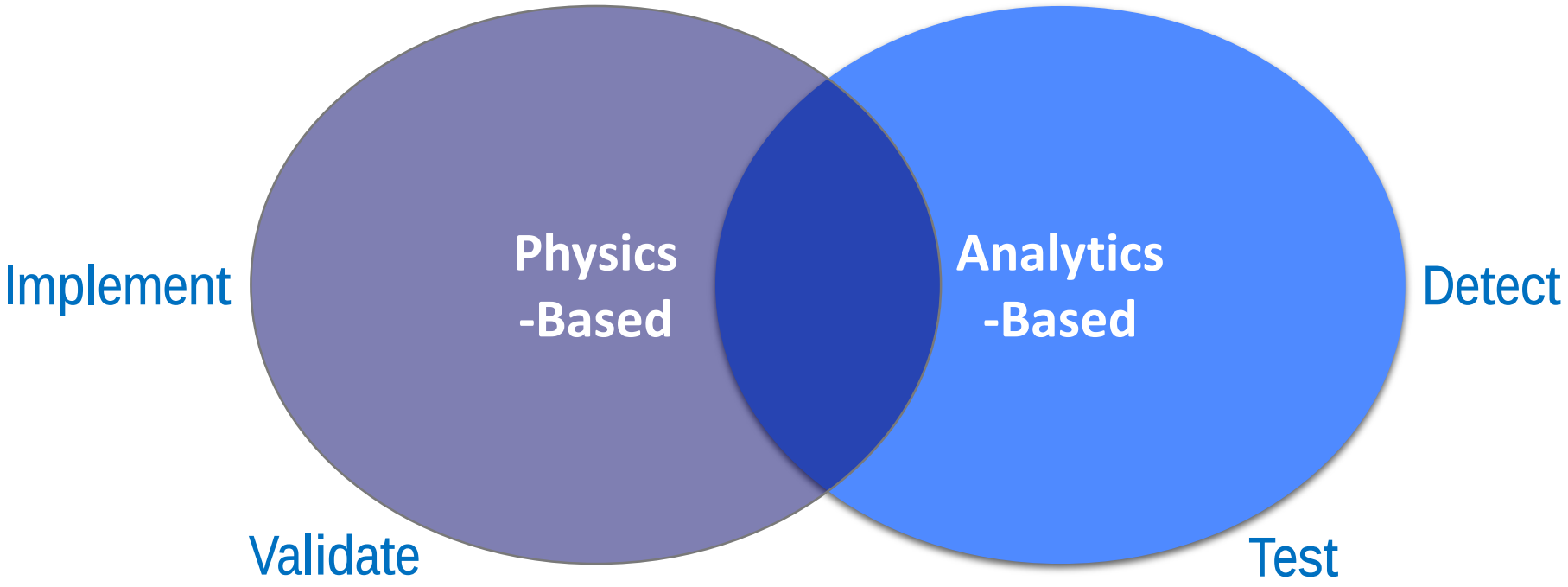
Predictive Accuracy



Optimizing multi-well development for NPV via machine-learning analytics reduces risk & enhances total asset value

Wrap-up

Multivariate, multidisciplinary, multidimensional



Integrating traditional workflows with rapid analytics accelerates technical insights & understanding

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Technology & Big Data Summary

- Physics-based technical assessments remain essential
- High-resolution geomodels heavily influence workflows
- “Big Data Analytics” taking off
- Macro industry insights
- Future for new industry entrants

Thank You