

Improving Drilling Performance by Leveraging New Data Aggregation and Visualization System

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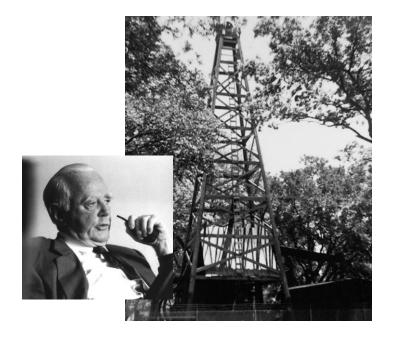






HUMBLE BEGINNINGS

- From initial seed capital of \$250,000
- \$62 billion in total assets at year-end 2015
- Founder Raymond
 Plank instilled a
 culture that enabled
 Apache to forge a
 unique path





Apache's strategy for value creation

Operational Flexibility	 Strategic objective to live within cash flow Diverse inventory of short, intermediate and long cycle projects Dynamic planning and centralized capital allocation process
Growth from Unconventional North America	 Extensive economic inventory anchored by Permian Basin Visible long-term production and cash flow growth Ability to find and develop new plays organically
Cash Flow from Int'l & Conventional North American Assets	 Sustainable production and free cash flow through step-out exploration and development Legacy onshore North American production base with low decline rates and significant free cash flow
Strong Financial Position	 Manageable debt level with minimal near-term maturities ~\$4.7 billion liquidity Strong cash margins per BOE
Capital Allocation	Actively manage the portfolioAllocate capital for long-term by using fully burdened rates of return

The values at our core



Region structure

Increased centralization with a balance of power between functions and regions

PERMIAN

Midland Basin and CBP/NW Shelf

HOUSTON

Canada, Mid-Continent and Gulf Coast

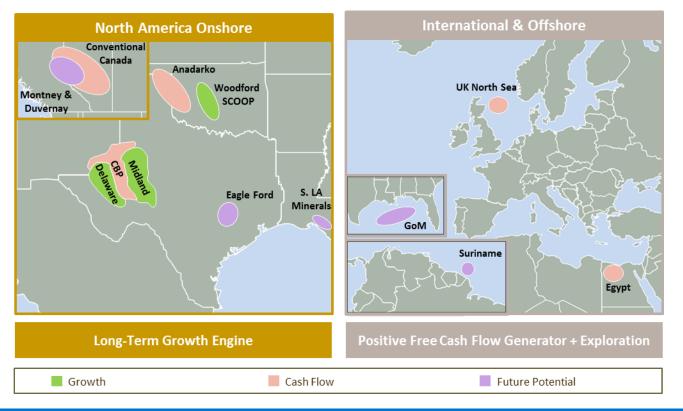


DELAWARE BASIN

INTERNATIONAL AND OFFSHORE Egypt, North Sea and GOM

Balanced portfolio

Focused on North American Growth



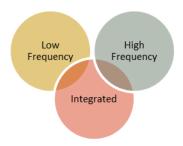
Why Do this project?

- With drop in oil price, large efficiency drive and improving performance to drive down well costs and make more acreage economic
- To be successful, the use of data is crucial to accelerate these efforts
- Strategic drive to be data-driven in our decision-making
- Drilling Challenge
 - Current real-time data vendors use, at best 20+ year old technology to gather and display data on proprietary systems
 - Not easy to move data and combine high with low latency data sources
 - No enterprise store of real-time data
 - Impedes use of high-end analytic tools, to develop models to use in real-time to accelerate performance and learning



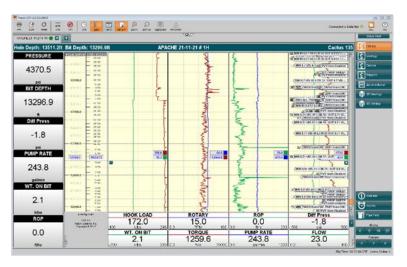
Data Strategy Goals/Deliverables

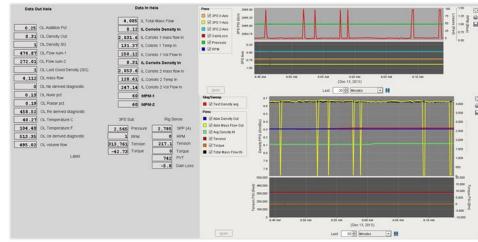
- Hi/Lo Frequency Data Quality
 - Clean important historical data
 - Seek better data
 - ▶ Hold the gains
- Easy Data
 - Aggregation
 - Manipulation
 - Reporting
- Actionable Data/Information
 - Predictive
 - Optimize
 - Discover
- Develop Competency, Resources
 - Visual analytics
 - Advanced analytics
 - Data/information aggregation
 - Process metrics
 - Algorithm development





Drilling EDR vs Process Control Visualization





High frequency data project – Phase 1

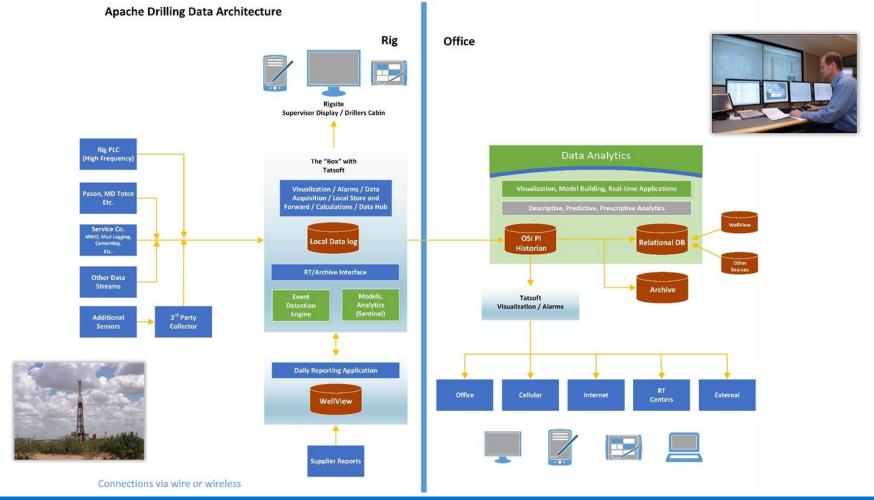
- Configure Tatsoft FactoryStudio at the rig site to give typical user experience
 - At rig site system has Visualization / Alarms / Data Acquisition / Local Store and Forward / Calculations / Data Hub / Database and open executable layer
 - ► Capable of taking <u>all</u> available data sources via communication protocols (OPC-UA, WITS, WITSML, to 4/20 ma signals) and data digital file formats
 - ▶ Time and depth views available to user
 - Instituted key rig site sensor calibration validation effort
 - Capable of 100 hz data, 1000 tags, 7 day storage onsite
 - Streaming rig state, modeling, executable algorithms
 - Running Bayesian network physics model in real-time to detect sensor data problems
 - Read/write capability onsite with Daily Reporting standalone at rig
 - Access to meta data needed to do modeling and reporting
 - ▶ Building capability to summarize high frequency data and auto fill drilling reports
 - Working on full traceability and transparency on all data from sensor measurement to storage to analytics
- Six systems deployed
- Video



Drilling Data Aggregation and Visualization







Results

- Deployed to six drilling rigs successfully
- Moving to full production as we speak including loading historical data from approximately 800 wells
- ► Ready to start Phase II which will leverage models to build smart alerts and alarms, more reports, data analytics
- Estimated value to Apache to date ?
 - Cost less than current vendor systems with increased capability
 - Continue tracking value going forward

Conclusion – moving forward into Phase II



Contact Information

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Questions

Please wait for the microphone before asking your questions

State your name & company

Please remember to...

Complete the Survey for this session



Thank You

"Not everything that can be counted counts, and not everything that counts can be counted."

Albert Einstein, Physicist



