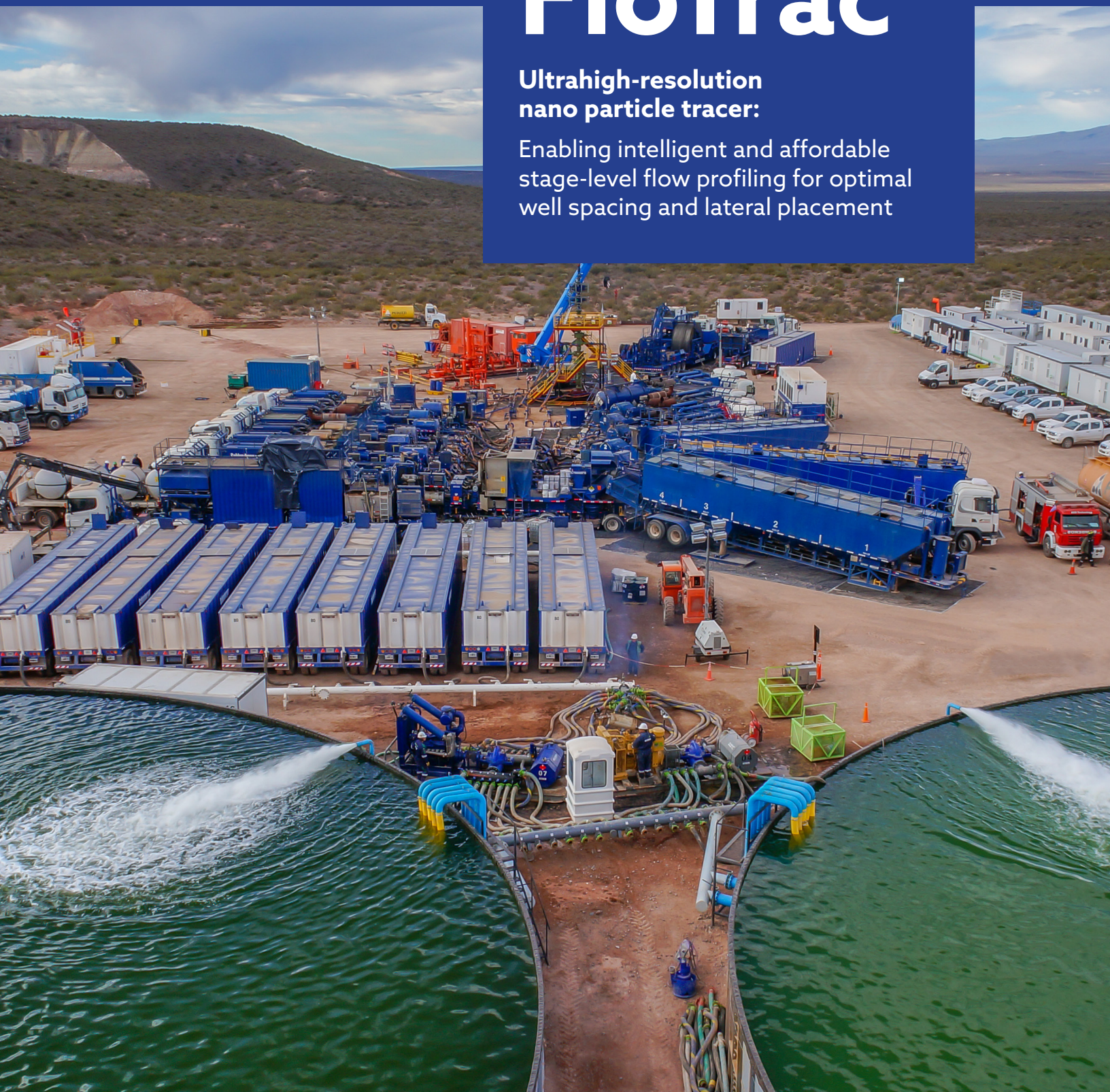
QuantumPro, Inc.

FloTrac™

Ultrahigh-resolution nano particle tracer:

Enabling intelligent and affordable stage-level flow profiling for optimal well spacing and lateral placement



FloTrac takes the blinders off unconventional field development

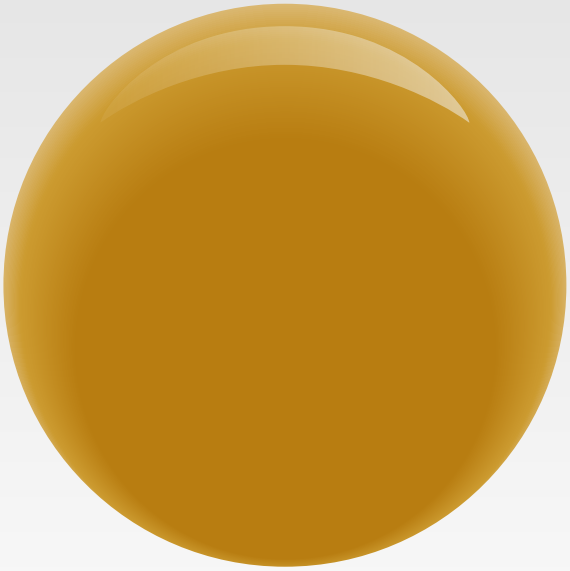
In today's multi-zone unconventional world having an accurate picture of post-frac flow behavior at the stage level is the key to unlocking maximum returns from your shale asset. However, optimal well and lateral placement, as well as an understanding of the production of each lateral stage, until now has relied on indirect measurements, supposition and rules of thumb. The means to gather the data necessary to optimize these key components have been limited to those with the economic heft to employ often prohibitively expensive fiber-optic measurements, chemical tracers, and similarly costly diagnostic technologies. Even then, the results can be questionable.

With the groundbreaking FloTrac™ ultrahigh-resolution nanoparticle tracer technology, QuantumPro is the only company to bring continuous, actionable and direct stage-by-stage flow mapping to mainstream unconventional wells. Integrated with the latest in data-driven on-site diagnostics, uniquely tagged and non-radioactive FloTrac tracers deliver exceptionally precise and enduring stage-level flow profiles in near real-time. **And, at a cost that is essentially a rounding error in the total cost for your completions.**

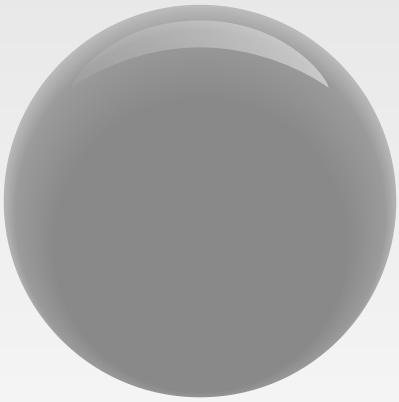
For you, this means the horizontal laterals in your multi-well and multiple-bench development can be landed precisely in the sweet spot. It also means, every stage is contributing to maximum reservoir drainage, measured down to the individual stage level on a daily basis. Importantly, along with right-sizing your well spacing, FloTrac effectively enables you to head off production-draining and costly inter-well communication, better known as frac hits.

As an ever-growing number of major and independent operators can well attest, the precision of FloTrac-derived data is undeniable. The results from non-intrusive FloTrac ultrahigh-resolution nanoparticle tracer deployments in a variety of completion designs and flow mapping programs have correlated remarkably well when benchmarked against high-cost permanent fiber optics and production logs measurements.





40/70 FRAC SAND
212 µm - 420 µm



100 MESH SAND
149 µm



400 MESH SAND
37 µm



FloTrac™ tracers
0.1 - 1µm

Applications

- Flow assurance and stage-level flow profiling
- Frac hit mitigation and inter-well flow diagnostics
- Completion optimization and optimal lateral placement
- Far-field flow mapping with multi-traced stages

Features

- Cost-effective and inert nanoparticles
- 100-plus distinctively tagged nano tracers
- Compatible with both oil and water fluid streams
- Unique composition, fingerprinting process
- Non-hazardous and non-radioactive material
- Ultra-high-temperature stability (up to 2,000° F)
- Non-intrusive automated deployments
- Seamless integration with fracturing pumping process
- Benchmarked against fiber optic and production logging
- Near real-time date-driven onsite diagnostics
- Physics-based rigorous sub-atomic detection
- Granular-stage-level and long-term flow representations
- Intelligent diagnostics for completion optimization

Benefits

- Highlights non-productive and non-performing stages
- Detects frac hits accurately with no false positives
- Requires zero surface and subsurface modifications
- Enables robust near real-time measurements of flow behavior
- Maintains stability for long-term production monitoring
- Delivers results beyond chemical and particulate oil tracers
- Provides detailed graphic representations of stage-level flow
- Helps reduce frac-generated emissions to advance ESG initiatives
- Maximizes reservoir drainage and mitigates frac hits challenges
- Reduces completion and multi-stage frac costs significantly
- Achieves best production per foot and optimizes completion designs
- Allows optimization of lateral placement for new developments
- Enhances shale asset value and maximizes return on investment (ROI)

FloTrac redefines tracer performance

FloTrac will make you forget everything you may have experienced with using conventional tracers to help quantify flow.

For one thing, you no longer have to mix and match tracers for every stage, often with exotic and costly formulations, to address different fluid streams. Unlike chemically-based and particulate oil tracers, each uniquely tagged FloTrac nanoparticle is fully compatible with both oil and water. That means you only need a single tracer for each stage, reducing tracer costs considerably.

Soluble liquid tracers also tend to dissolve quickly after deployment and often experience high rock absorption, providing only a brief glimpse of production flow. Owing to their inherent insolubility, FloTrac nanoparticles remain intact within the conductive proppant pack, enabling robust monitoring for more than six months after initial deployment. FloTrac inert particles, likewise, are unable to seep into the small fissures and the discrete fracture networks (DFN) opened up during the fracturing process, thereby preventing what chemical tracers all-too-often display as false frac hit signals. These false flags often lead to incorrect well spacing decisions or unnecessary remediation costs.

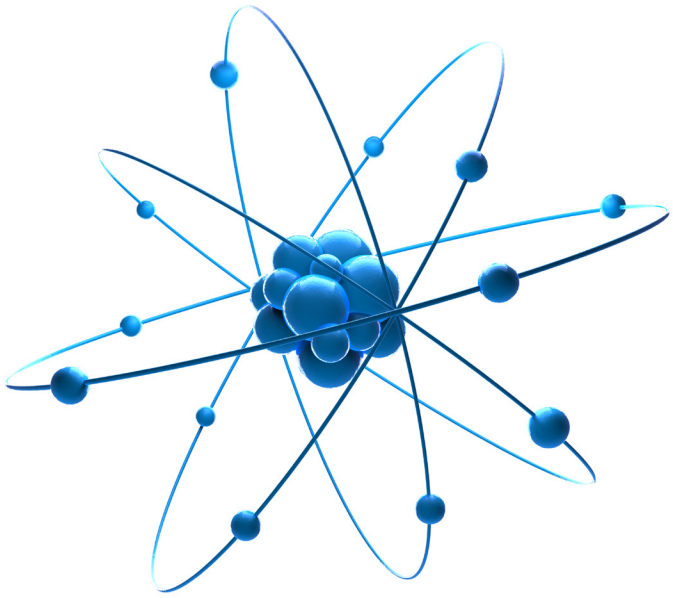
In yet another key distinction, the more than 100 unique FloTrac nanoparticle tracers in the QuantumPro portfolio are exclusively formulated for the highest sub-atomic detection accuracy and resolution, enabling exceptional surface recovery rates that are proportionate to the hydrocarbon production. Importantly, differentiating diagnostic field data shows this intelligent tracer technology exhibiting a high level of precision in mapping the near-wellbore flow profile and field-wide infill frac hits.

The distinctive fingerprints of the FloTrac nanoparticles require no radioactive materials and are safe to handle, elevating both your environmental profile and ease of production sampling. What's more, the unequaled capacity of FloTrac to pinpoint stage-level performance, not only saves the costs of completing otherwise unproductive or minimally producing stages, but eliminates associated carbon dioxide (CO_2) emissions from by reducing both the pressure pumping hours otherwise devoted to non-producing stages and the logistical requirements of locally sourced frac sand. Consequently, FloTrac can help advance your ESG initiatives and serve as a critical enabler in emission reduction strategies.

FloTrac meets highest standards, from start to finish

The production of every FloTrac ultrahigh-resolution nanoparticle tracer follows a rigorous manufacturing, quality control and testing protocol. Prior to deployment, QuantumPro again puts each FloTrac nano tracer though stringent lab testing and validation processes to ensure ultimate down-hole performance and flow efficiency.

Once approved for your specific application and objectives, FloTrac tracers are easily deployed, using a precise, and completely non-intrusive, automated dosage system with real-time injection monitoring, requiring no additional surface equipment or down-hole modifications to the existing well completion or pumping design.





Intelligible stage-level flow data at your fingertips

"Intelligent" is truly the operative word for the unique diagnostics QuantumPro brings to each and every unconventional well. Using our advanced geomechanics and frac diagnostic expertise, QuantumPro stands alone in the ability to help our clients diagnose reservoir, completion and pumping issues, especially in identifying non-producing stages and detecting frac-hits.

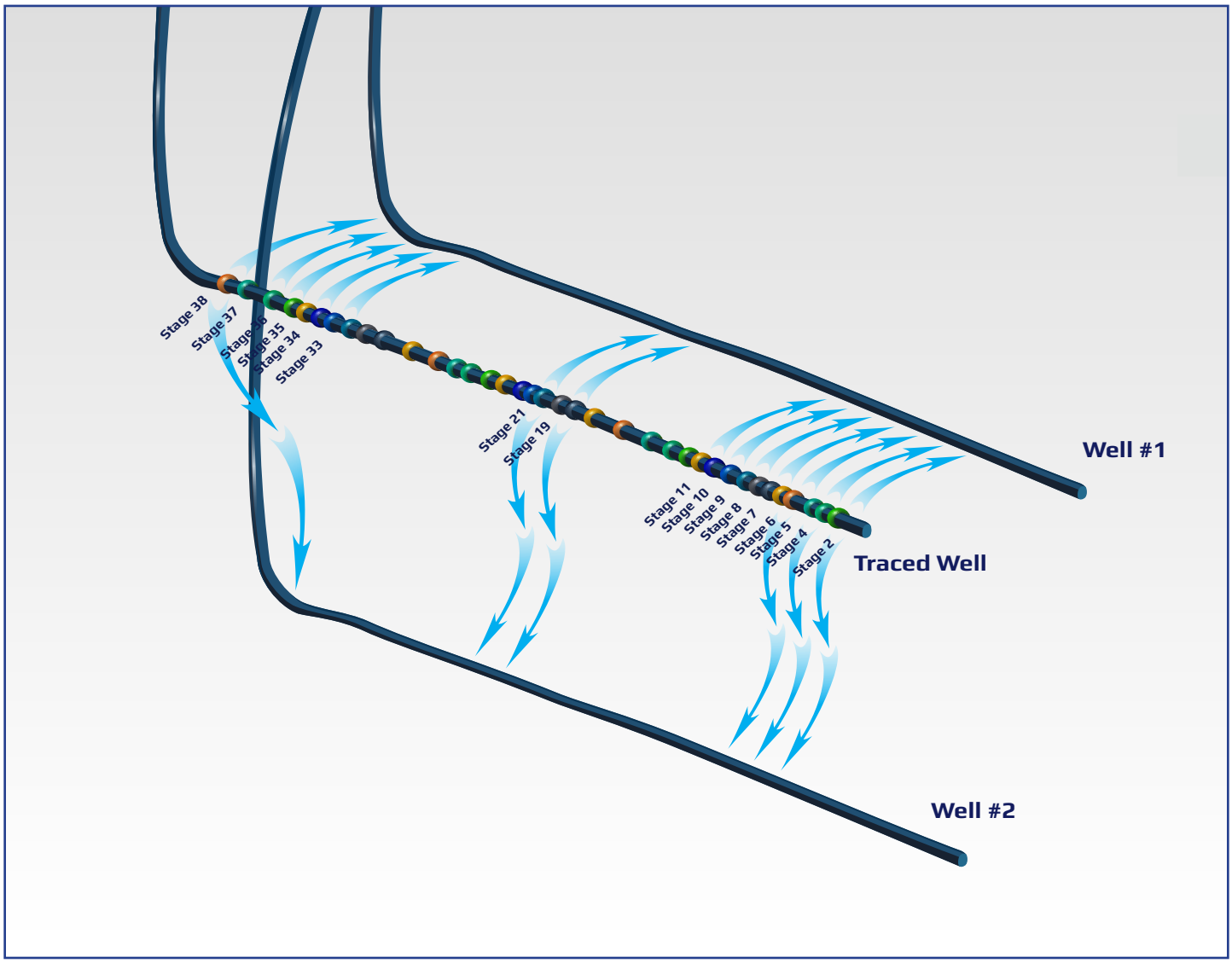
The seamless flow to post-frac production analysis begins after deployment, where we employ a specially designed portable analytical lab, enabling on-site flowback sampling, extraction, and interpretation in near real-time. You no longer have to wait days, or weeks, to await sample delivery and the completion of off-location lab tests.

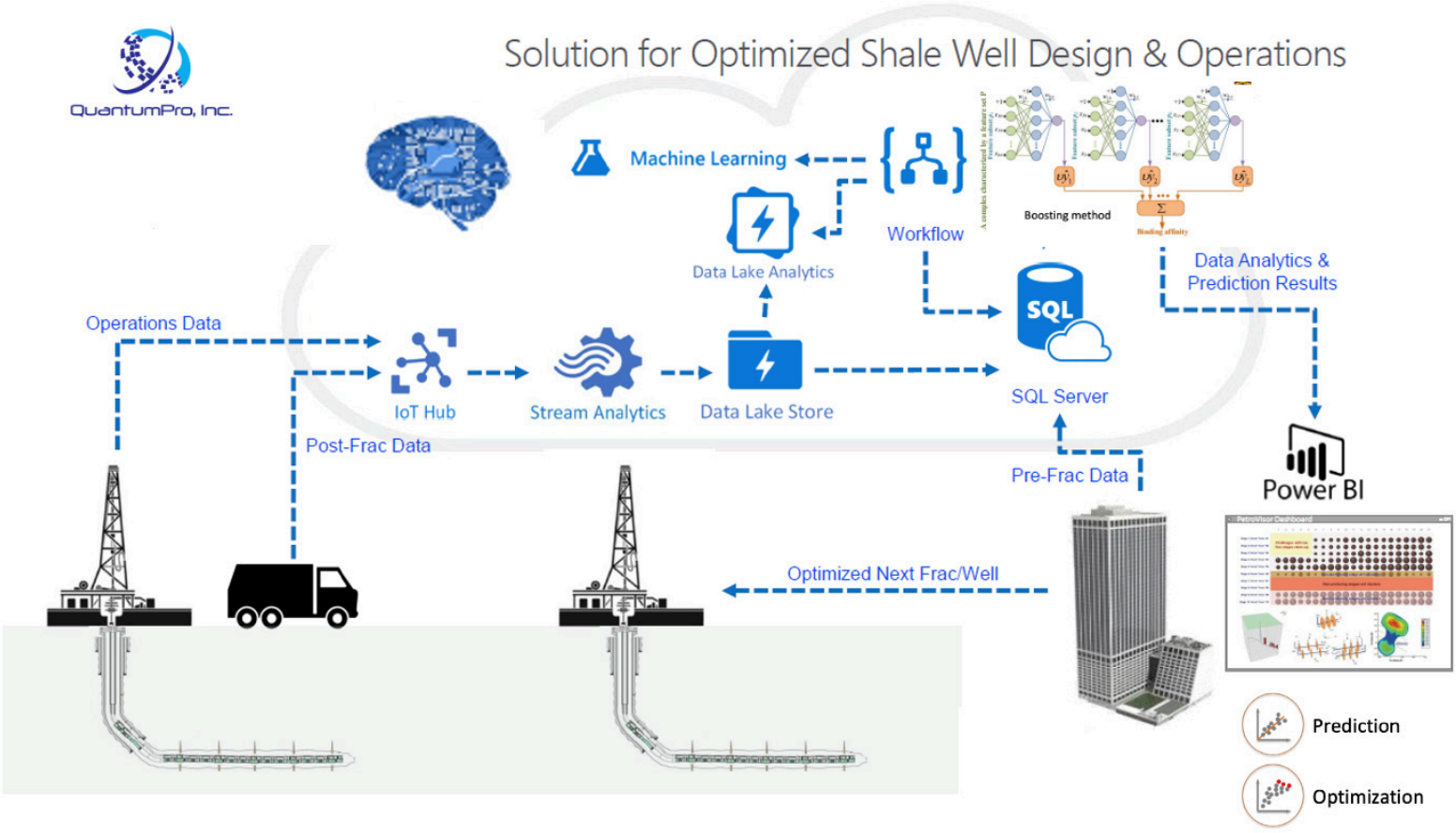
FloTrac - Improved lateral design and placement

Using the latest in data-driven analytics, Quantum-Pro encapsulates the results in high-quality graphic representations, giving you a fluids eye-view of near real-time flow behavior. You can clearly monitor which stages are providing maximum production contribution and which are not. You can see if each stage placement and spacing is fully optimized, and even what frac design/s would deliver maximum production. To further help guide your subsequent development strategy, you can clearly visualize where your specific lateral or vertical placement falls in relation to the sweet spot.

Most of all, data from recovered FloTrac ultrahigh-resolution nanoparticle tracers clearly identify communication between wells within the development. **FloTrac is unique in its capacity to characterize production-draining direct frac-to-frac communication to far less consequential and prevalent fluid migration.** The ability to mitigate direct frac hits is receiving more urgency as enhancing the potential value of the available acreage requires increasingly tighter inter-well spacing and surgical well placement.

FloTrac tracer technology stands alone in clearly identifying costly frac hits and nonproductive stages in multi-bench unconventional developments.





FloTrac joins forces with big data and artificial intelligence (AI)

Completion diagnostics is a complex multi-disciplinary exercise, requiring keen insight into myriad components, including formation evaluation, geologic and geomechanics modeling, reserves estimation, hydraulic fracturing pressure analysis, and dynamic simulation. Those components are distinctly integrated with the measured stage-level flow profiles of the FloTrac ultrahigh-resolution nanoparticle tracers into neural network-enabled deep learning to optimize future field development.

A purposely configured artificial neural network engine unites the stage-level production profile with specific client well data, including the fracture stimulation and completion designs. This readily accessible data is subsequently employed to optimize future horizontal well designs, properly place the stages with optimum distances, determine the optimal number of clusters within each stage and avoid frac hits. The extensive post-frac FloTrac dataset enables deep machine learning, or based on the results, trains the neural network to enable high-performance computing (HPC) to adjust the neuron input weighs and resulting impacts for every well. In so doing, it clears the way for progressively smarter designs with each successive well.

FloTrac™

FloTrac gets the most out of your unconventional asset

By every standard of measurement, the FloTrac ultrahigh-resolution nanoparticle tracer, in tandem with big data-and AI-driven diagnostics, can help drive maximum returns and value from your shale investment, and at a cost that fits well within any completions budget.

To learn more about how FloTrac can maximize the value of your unconventional asset, contact **QuantumPro, Inc.** at

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