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From Data to Decisions: Should the Industry Abandon Traditional Reservoir Modeling?

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Abstract

Traditional 3D reservoir models remain indispensable for forecasting hydrocarbon performance and guiding investment decisions—yet they have inherent challenges: integrating multi-scale, multi-vintage datasets and mitigating inherent interpretive biases. These limitations are compounded by protracted project timelines, dictated by data readiness gaps and reliance on specialized human expertise.

The convergence of AI, data science, and advanced computing now presents a watershed opportunity: the chance to fundamentally rearchitect these workflows. While AI has catalyzed revolutions in sectors like finance (via algorithmic trading), its energy sector applications have remained evolutionary rather than disruptive. Today, by unifying disparate datasets (well logs, seismic, production histories) and directly encoding domain physics (geology, geophysics, petroleum engineering), AI systems could circumvent conventional 3D modeling and history matching altogether. This shift would not only refine existing practices, but it could deliver order-of-magnitude improvements in predictive accuracy, uncertainty quantification, and decision velocity.

This keynote examines a critical question: As we stand at this technological inflection point, should the industry pursue this paradigm shift? We explore the feasibility of such an AI-driven transformation, inviting debate on whether the industry can or should move beyond conventional modeling frameworks.