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Integrated Reservoir Modelling: Were we not Seeing the Forest for the Trees?

Yaqoub Al Hosni[1]

[1]Petroleum Development Oman (PDO)

Abstract

Due to their capability in estimating inter-well reservoir properties, quantifying uncertainties and predicting production performance, 3D reservoir models have evolved to become an integral tool guiding investment decisions. Once the production behavior of the field is history matched with acceptable accuracy, the production behavior is simulated. The subsurface teams could theoretically generate an infinite number of scenarios, test multiple concepts, estimate reserves and use the models to assist well planning and well & reservoir management activities. Technological advances over the past 30 years allowed handling large amounts of data and hence building larger, more complex static and dynamic models. As a result, 3D models became a requirement for nearly all subsurface studies. That seemingly exciting endeavor has faced tremendous challenges and led to disappointments. In addition to the building process becoming cumbersome and time-consuming, many of those models poorly predicted static reservoir properties and subsequently production behavior. Across the oil and gas industry, one of the reasons projects under-performed against their original production forecasts are the poor models built to support the subsurface study. The underperformance impacted project economics, lead to reserves de-booking and affected some companies' reputation.

The oil and gas industry is on the verge of a 'new' era with more technological advances, namely Data Sciences, Artificial Intelligence (AI) and Machine Learning (ML). This keynote addresses some of the learnings, challenges and shortfalls of current 3D modelling practices leading to envisaging a new picture for the future of modeling.