# DHI/AVO Analysis Best Practices: ExxonMobil's Worldwide Prospective

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Industry increasingly relies on DHI (Direct Hydrocarbon Indicator) and AVO technology to identify and risk prospects in many key exploration areas, including West Africa, the Gulf of Mexico, and the North Sea. As a measure of the impact of this technology, success rates are higher in plays where DHI technology can be applied (+20% for ExxonMobil wildcats). Several years ago ExxonMobil developed a best practice approach to evaluate and understand the risk for DHI dependent plays. The best practices covered both Land and Marine settings. Within this best practices, a calibrated DHI-rating system using both DHI and data quality characteristics was designed. The rating system has proved to be a valuable structured approach to evaluate DHI quality on a risk analysis basis. A recent audit of this system showed an excellent correlation between predicted chance of validity, the chance that the anomaly is due to hydrocarbon, and the actual anomaly success rate. The audit covered over 100 drilled anomalies within DHI-dependent plays.

Several examples, of land and marine, from around the world illustrate key learnings for successes and pitfalls in DHI/AVO analysis. Key points include:

Preservation of seismic amplitude and phase is critical. Standard industry seismic acquisition and processing can create false anomalies and errors in quantitative predictions as proven by subsequent drilling.

Non-unique seismic response remains a fundamental limitation on our ability to predict reservoir thickness and fluid type (e.g., oil versus gas).

3D AVO and visualization are powerful techniques for recognizing subtle fluid anomalies, which would otherwise be difficult to recognize.

Experience indicates that best practice application of DHI technology is dependent on both optimal technologies and work processes, including:

Calibration using physical property and modeling analysis to cover all possibilities

Improved seismic data quality, including pre-stack attributes for both Land and Marine data

Not relying on a single DHI attribute as a silver bullet

Integration of DHI analysis with other technologies and the geology

Continuing development and implementation of new and emerging technologies

By following the prescribed approach one can insure a higher success rate in using the DHI technology to find oil and gas reserves.