Fault interpretation uncertainty – A practitioner point of view.

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Fault interpretation plays a crucial role in the life cycle of fields, as structural models form the foundation of subsurface models used to make exploration, appraisal, development / production decisions, reserves estimations and production forecasts. However, Interpretation uncertainties are highly subjective, and measuring uncertainty ranges for input in deterministic and probabilistic forecasting methods can be challenging.

In this study, we propose a novel approach to quantify the economic impact (in MMbbl) of interpretation uncertainty by considering two main sources: structural interpreter uncertainty (IU) and geophysicist interpreter uncertainty (GU). Five static models (M1 to M5) were constructed with the participation of four interpreters (Interpreter I to Interpreter IV) using two 3D seismic cubes (Seismic I and Seismic II) (Figure 1). The main assumptions made were: (1) Independent structural interpreters generate equiprobable scenarios (DSx); (2) Each interpretation is highly valuable as it represents a unique professional profile; (3) Each interpretation was incorporated without expert review to minimize "herding" effects; (4) A single interpreter cannot generate multiple "independent" interpretations; and (5) The IU is measured as the range of scenarios DS1-3-5, while the GU is measured as the range of scenarios DS2-4.

This empirical multi-scenario approach provides a more objective way to quantify fault interpretation uncertainty compared to a single interpreter/scenario approach. However, it requires more manpower and effort and necessitates skillful subsurface project management. The decision to implement this approach should be based on its capacity to influence decisions with economic implications. In the case study presented here, an optimized development phase with 13 well locations was achieved, striking a balance between incremental drilling costs and incremental attic hydrocarbon volumes.

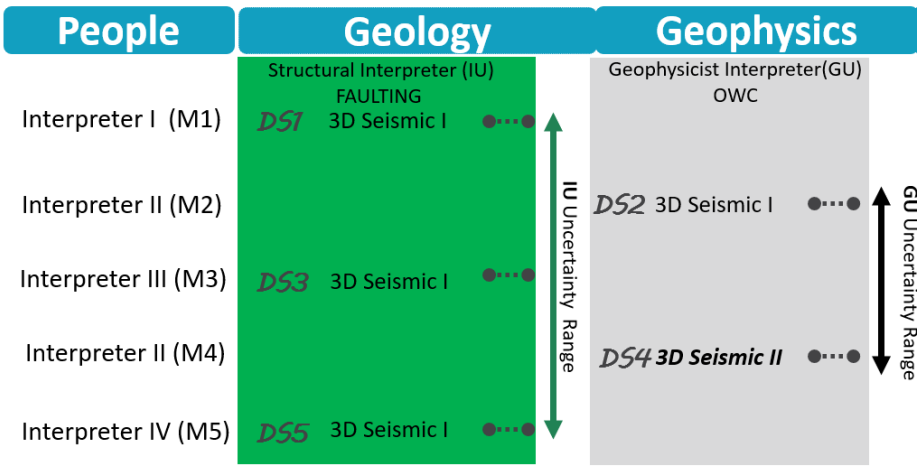

Figure 1. Study design to quantify interpretation uncertainties in a mature field.