Summary

Play fairway analysis (PFA) and common risking segment (CRS) mapping is commonly used in evaluation of frontier basins. However, it can successfully be applied to more mature basins where moderate sized accumulations perhaps in subtle trap configurations await the attention of the creative explorer. This course will emphasize how understanding the geology can lead to identification of untapped resources.

Learning Outcomes

Participants will learn to:

1. Evaluate 'hero' lines and define the key plays in a basin.
2. Map the understanding of the play elements (presence and effectiveness of reservoir, source and seal) and consider interpretation confidence and alternative models.
3. Integrate risks on all play elements to compile common risk segment maps and calibrate with drilling statistics and well failure/success analyses.
4. Determine play resource and yet to find estimates using various techniques including creaming curves and gap analysis, geochemical volumetrics, and prospect density.
5. Identify and risk the edges of subtle traps (sub-crop, combination and stratigraphic traps) especially in mature basins.

Duration and Training Method

This is a four-day classroom ‘hands-on’ course with a number of informative exercises designed to get across the principles, punctuated by a series of short talks. The course will have a workshop format with the majority of time spent using and interpreting the data under the guidance of an industry expert. Case histories are taken from the UK and Norway, USA and Canada, Indonesia, Brazil, Vietnam, amongst others.

Who Should Attend

The course is aimed at explorers with experience of seismic interpretation, having a sound understanding of other geoscience disciplines and how they impact petroleum systems and plays. The course is aimed at the fundamental level for geoscientists with 1-5 years of experience, though it will also serve as an excellent refresher for more experienced explorers.

Prerequisites and Linking Courses

Petroleum systems understanding underpins play fairway analysis. Basic understanding of the application of petroleum systems analysis acquired via N010 (Geochemistry and Petroleum System Modelling) on the Nautilus Training Alliance programme is assumed. In addition, a basic working knowledge of structural geology, offered in N016 (Structural Geology for Petroleum Exploration, Nevada, USA) and N116 (Structural Geology for Petroleum Exploration, SW England), seismic interpretation, offered in N085 (Introduction to Seismic Interpretation) or N040 (Interpretation of 3D Seismic Data) is required. An understanding and application of sequence stratigraphy acquired via N007 (Seismic and Sequence Stratigraphy for Play Prediction and Basin Analysis) is also required.
Course Content

Day 1

Play definition: play fairway, and petroleum system. Play fairway map, events chart and play cartoon. Importance of the regional foundation (structure, stratigraphic and petroleum systems).

Work flow overview (play definition, play elements and interpretation confidence map, Common risk segment mapping, resource estimates at play level).

Play elements: construction of Gross Deposition Environment GDE maps from seismic, seismic attributes, isochores and key wells (reservoir, top seal and source presence).

Day 2

Reservoir deliverability, seal capacity and charge access. Importance of first carrier, lateral versus vertical drained systems, maturity versus organo-facies, effects of early oil and pore pressure on porosity, and charge focus.

Event charts.

Day 3

Trapping styles in different tectonic regimes and trap domain maps.

Risking plays using Common Risk Segment mapping - calibration using fields and well failures. Risk versus uncertainty, phase risk and composition.

Play resource (yet to find) estimates - creaming curves, field size distributions, areal yield, prospect density, leads and prospect inventories).

Importance of stratigraphic and subtle traps in the exploration of mature basins. Definition and classification of the trap edges.

Day 4

Full day exercise on North Slope Alaska. This is rather topical at present given a number of world class discoveries. Subtle trapping controls majority of the discoveries in the basin and stratigraphic trapping may provide substantial undiscovered volumes.

The database is a good quality 2D seismic grid over the NPRA, supplemented with outcrop and well data, and fields from the prolific area over the Barrow Arch to the east. Participants will evaluate a regional line and construct a play fairway cartoon. Agree which are the key horizons to map for a regional evaluation and map these around on the available regional grid. They will construct a structure map of a key surface for migration and consider the sub-crop and supra-crop configurations. Teams will be assigned different reservoir GDE and or source presence GDE’s. We will then tackle the 3 effectiveness play elements (seal capacity, reservoir quality and charge access). This leads onto construction of CRS maps and
consideration of resource estimates. We will have a discussion of where the future potential lies. We will consider key failures and successes in the basin and their implications for future potential.