

# New Integrated Services

## Perf Cluster Optimizer

Optimization of the stage and cluster placement along a horizontal well as an additional service to a horizontal geomechanical log evaluation.

1. Geometric stage spacing with Combinatorial Optimization of the cluster spacing
2. Both stage and cluster optimization for a complete Completion Combinatorial Optimization

## Production Analysis Work

1. 200 well DCA analysis with Excel and PowerPoint report
2. Additional PHDWin project
3. Additional Spotfire Project
4. Additional 2D maps of DCA attributes
5. Additional production type curve analysis by two attributes

## Areal Production Assessment

1. 100-200 well DCA analysis
2. 2D maps of DCA attributes ( $Q_i$ ,  $D_e$ ,  $b$ ,  $D_m$ ,  $EUR_o$ ,  $EUR_g$  and  $EUR_{boe}$ )
3. Production type curves by two attributes
4. Economic modeling for each percentile of the production type curves (P10, P50 and P90)

## Financial Montage – Asset Valuation Assessment

1. 3-4 NULOOKS
2. 1 NUSTIM Look Forward with existing completion design
3. 1 NUSTIM Look Forward with optimized completion design
4. 2 cross sections N-S and W-E
5. Single well economic modeling of items in 2 and 3 above.

## Multiphase Financial Montage Assessment

1. Same as all the items from the Financial Montage but with multiphase dynamic model forecasting to properly account for all three phases flow streams at the well.
2. History matching of existing wells is available.

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## **Areal Financial Montage – Asset Valuation Assessment**

1. Reservoir characterization attributes in the AOI from existing regional studies
2. 100-200 well DCA analysis of offset areas to the AOI
3. 2D maps of DCA attributes ( $Q_i$ ,  $D_e$ ,  $b$ ,  $D_m$ ,  $EUR_o$ ,  $EUR_g$  and  $EUR_{boe}$ )
4. Production co-modeling to deliver 2D maps of representative reservoir attributes across the area
5. Correlation optimization between a formulation of reservoir attributes to deliver an RPP map, which highlights the reservoir production potential across the AOI.
6. Production type curves by two attributes (area, operator, formation, RPP, etc.)
7. Economic modeling for each percentile of the production type curves (P10, P50 and P90).

## **Areal Financial Montage Production Type Curve Extrapolation**

1. Same workflow as in the Areal Financial Montage, but with the addition of using a strong correlation between production and a formulation of reservoir attributes to extrapolate production type curves into areas with little or unknown production history. This enables the ability to perform economics on areas and formations that are ahead of the wave.
2. Economic modeling on up to 2 AOI or update economics from Areal Financial Montage.

## **Sector Forecasting with 3D 3Phase Dynamic Modeling**

1. Sector dynamic modeling from homogeneous NULOOK assessment or as a result of a model cut from one of our regional studies.
2. Sector modeling involving less than 500k “gridblocks”.
3. Hydraulic fracture and completion definitions from NUSTIM.
4. Forecasting only with minimal or no history matching necessary. A total of 3 forecasting scenarios are delivered such as (BHP constraint, maximum flow, fracture size modulation, spacing between wells, etc.).

## **Sector History Matching and Forecasting with 3D 3Phase Dynamic Modeling**

1. The model build and forecasting specification remain the same with the addition of a history matching process.
  - a) History matching 1 well. Additional wells are possible. The target match  $\leq 10\%$  overall field match error.
  - b) History matching fluid production only - no pressures.

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