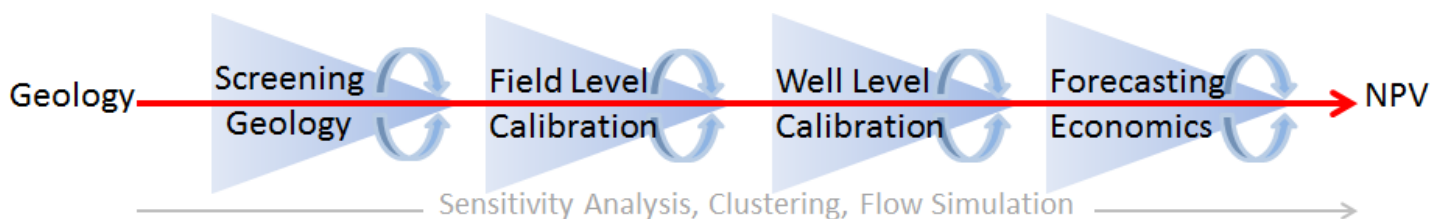




# EVOLVE

## Geology to NPV

**EVOLVE** is an integrated reservoir forecasting workflow within **studioSL** containing four steps that work together to progress from multiple geological models to NPV distributions of different forecast and economic scenarios. **EVOLVE** grows and shrinks the ensemble of models through sampling, clustering, and sensitivity analysis. By carrying an ensemble of models through to NPV, the economic uncertainties can be quantified and used in making better decisions.

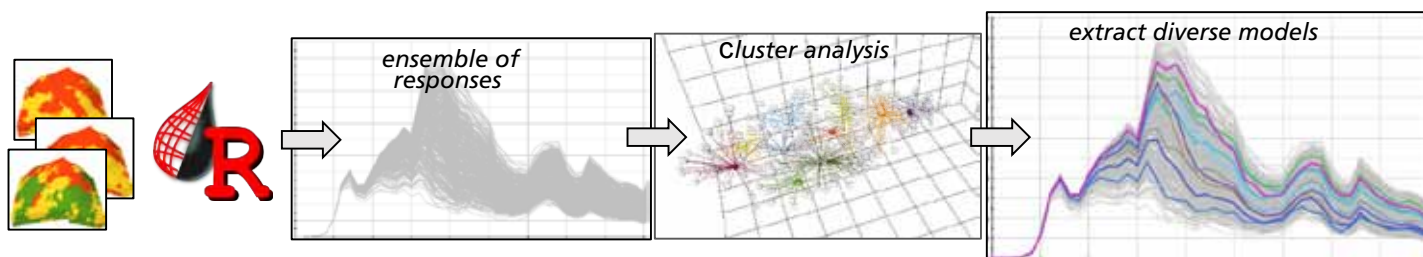


The *EVOLVE* workflow.

1

### Stage 1: Screening Geology

The objective is to extract a smaller ensemble of geomodels that is representative of the diversity of a much larger ensemble. The concern is not how models compare to measured production data but rather how model responses compare to each other. Model diversity is identified through multidimensional scaling (MDS) and cluster analysis. An efficient flow modeling proxy to compare model responses is essential at this stage.

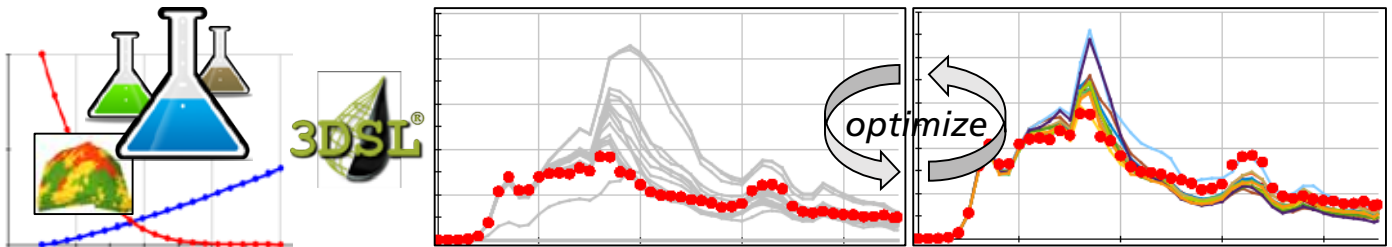


Screen flow responses of geo-models. Extract a subset that retains diversity.

2

## Stage 2: Field Level Calibration (History Matching)

The geo-ensemble from Stage 1 is combined with flow parameter uncertainties (OWC depth,elperm functions, PVT properties, etc.), increasing the ensemble size again. The objective here is to reduce the ensemble by keeping models that match field history and retain diversity in input parameters.

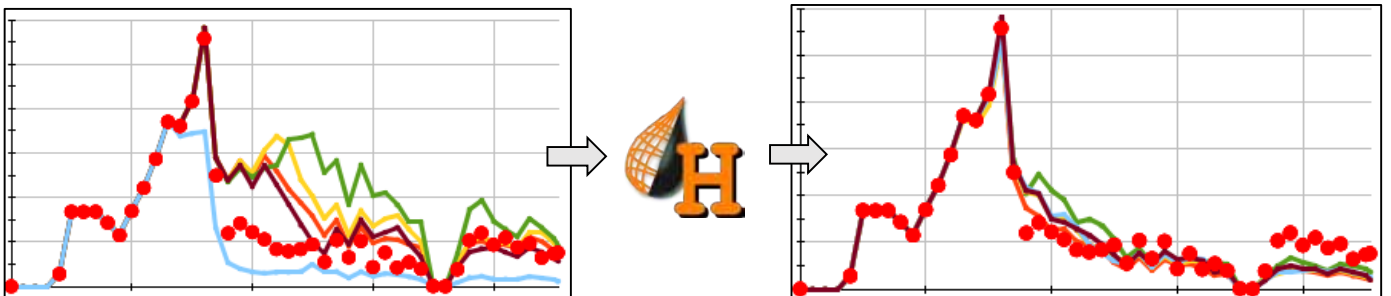


*Find a reduced ensemble that brackets field production history while retaining parameter diversity.*

3

## Stage 3: Well-Level Calibration (History Matching)

Stage 2 will yield an ensemble of models that display an acceptable match of the field response. Individual well responses, however, are not guaranteed to exhibit the same match. A novel, well-level history matching algorithm based on streamlines is used to modify inter-well geology to improve individual well matches for all models of the ensemble, or a selected subset.

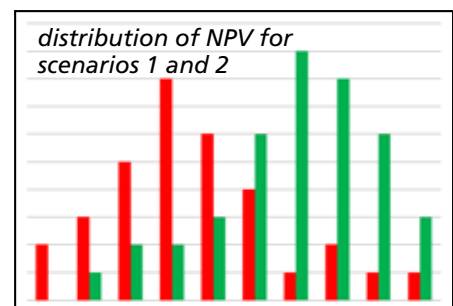
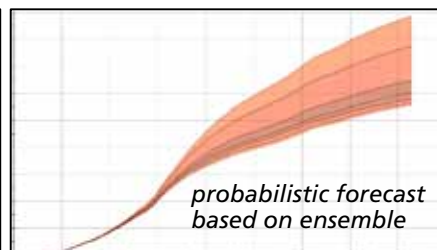
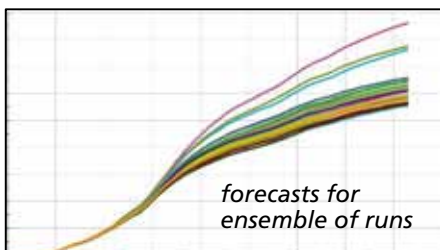


*Automatically perform well-level history matching on an ensemble of models using the HM-project.*

4

## Stage 4: Forecasting & Economics

The final step of the **EVOLVE** workflow is to forecast the final model ensemble, which is robust and practical. Robust means the models exhibit diversity yet match history; practical means the number of models is manageable. The ensemble is used to forecasts production profiles associated with multiple development strategies. In turn, the responses of each strategy is combined with differing economic scenarios to estimate NPV distributions that can be compared and used to guide the decision making process.



*View forecasts individually or probabilistically. Generate histograms of NPV for each scenario.*