

Fundamentals

Reservoir Management | Fundamentals

The reservoir management consists on the application, within a given fiscal and contractual frame, of well-established industrial technologies and field best practices to a hydrocarbon reservoir, in order to efficiently perform the field operations and maximize the economic return of the investments.

Reservoir Management relies on the use of human, technological and financial resources to capitalize on profits from a reservoir by optimizing the hydrocarbon recovery while minimizing both the capital investments and the operating costs.

Reservoir management has advanced through various stages due to better-quality techniques, improved knowledge of reservoir behavior, ad hoc IT software that has helped the interpretation, processing and management of all available data.

Main objectives of the reservoir management activities can be summarized as follows:

- *Decreasing of the risk*
- *Increasing of the oil and gas production*
- *Increasing of the oil and gas reserves*
- *Minimization of the capital expenditures*
- *Minimization of the operating costs*
- *Maximizing of the final hydrocarbon recovery*

The economic optimization of oil and gas recovery can be obtained by:

- *Identification and characterization of all single reservoirs in the field and of their overall physical properties*
- *Analysis and interpretation of the past behavior of all reservoirs and prediction of their future performance*
- *Reduction of drilling of unnecessary wells*
- *Definition and modification (if required) of wellbore and surface systems*
- *Starting of operating controls at the proper time*
- *Concern of all pertinent economic and legal factors*

Reservoir management must be considered as a dynamic process that aims at identifying the uncertainties affecting the future field behavior, and tries to reduce their impact by optimizing the field performance through a systematic application of integrated, multidisciplinary technologies.

The reservoir management process must be designed and implemented to individual fields on the basis of:

- *Logistics and size of the field/reservoirs*
- *Geological complexity of the field/reservoirs*
- *Reservoir rock and fluid properties*
- *Depletion state*
- *Regulatory controls*
- *Economics*

Reservoir management relies on a fundamental tool which is Reservoir Modeling.

The role of reservoir modeling in the reservoir management process

The modelling process is based on the following main steps:

- *reconstruction of a reservoir geological model*

- *geological characterization and fluid properties definition*
- *selection of a reservoir mathematical model*
 - *upscaling and initialization*
- *calibration of the reservoir geological model*
 - *past history matching*
- *prediction of the reservoir future performance*
 - *production forecasts*

Workflow of the Reservoir Management process

Schematic block diagram of the reservoir management process