SPE 57472 Managing Risks Using Integrated Production Models: Process Description

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This paper looks into an asset-management-analysis process to quantify and manage the uncertainty associated with field-development design, implementation and operation. This is called Risk Based Integrated Production Model (RIPM) which is based on three parameters: integration, quantification and validation.

Traditionally, the producing system is split into three sections; reservoir, well and surface facilities. Using this approach results in each engineering function modelling and optimising locally rather than globally. This is a slow approach and limits the evaluation of alternative options during the design phase of the project and the ability to react to any new information throughout the implementation and operation phases. As such, the system design and performance suffer because the optimisation is managed at the subsystem level only and one subsystem's design may constrain the overall system unnecessarily.

The three principles upon which RIPM is based are described below in further detail:

- *Integration*
  Evaluate the impact of an option on the entire system
- *Quantification*
  Compare different options on a consistent, absolute system
- *Validation*
  Identifies gaps in the data and deficiencies in the technical models to define the uncertainties and subsequent avenues for improvement.

By dynamically linking the reservoir, well and surface facility subsystems (integrating), a quick evaluation of the entire system performance is achieved and the risk can be quantified from the uncertainty in the assumptions, data or forecasts. The steps taken to achieve a dynamically linked model and carry out a risk assessment are described below:

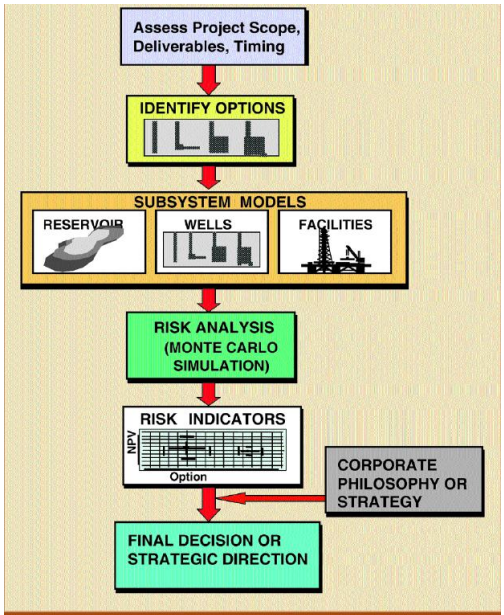

Fig. 3—RIPM process; NPV=net present value.

After applying this process for more than 12 field studies over 3 years, the following was concluded:

1. This was an iterative process which allowed for a quick assessment of multiple options with different scenarios for optimisation and strategic planning.
2. Addresses optimisation at the necessary technical level.
3. Process and tools aided decision making in the design implementation and operation phases of the asset life cycle.
4. Quantification and integration of uncertainty analyses aided strategic planning during the design phase.
5. System performance and validity of performance data can be evaluated quickly as data is acquired during the operational phase.
6. The process is flexible and can be customised without issue so the solution is not restricted to one system.