

COUGAR 3

Characterization of Uncertainty in Geoscience and Reservoir Modeling

OBJECTIVES

The objective of the Cougar consortium is to provide the participants with methodology and prototype software to make field development decisions in an uncertain environment.

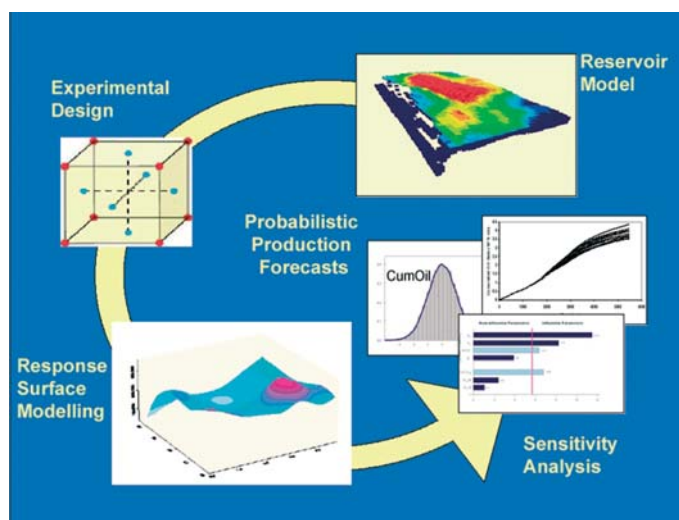
The Cougar 3 project is a logical following-up of Cougar 1 and 2, aimed at developing additional methodology and tools to tackle the problems of uncertainty management in the entire workflow of a field evaluation.

PROGRAM

The Cougar 3 JIP is aimed at doing research and developing the methodology and prototype tools for the following topics:

■ Obtain robust and predictive Response Surface Models (RSMs) to approximate the fluid flow simulator outputs

- "advanced methods to build RSM": to get an accurate risk analysis workflow for production forecasts given nonlinear behavior (departing from classical polynomial response surface);
- "taking time explicitly into account in the RSM": to better take into account the impact of uncertain parameters on response versus time, such as production profiles;
- "management of uncertainties using attributes": to decrease the complexity of the relation between the response and the uncertain parameters and increase RSM quality using reservoir engineering knowledge.



■ **Uncertainty from static to dynamic modeling**

- "uncertainty management for static modeling": to perform accurate sensitivity and risk analysis on static modeling outputs;
- "combining uncertainty of static and dynamic models": to obtain a reliable risk analysis workflow that integrates both static and dynamic modeling uncertainties.

■ **Integration of data for mature field** to constrain each reservoir uncertainty by the available production data, thereby reducing uncertainty on production forecasts.

■ **Selection of confirmation runs to check RSM quality** to accurately validate its further use in risk analysis for qualification, quantification or optimization.

■ **Enlarge the workflow to extend up to surface network modeling** to make better decisions that take subsurface, surface, and economic uncertainties into account.

DELIVERABLES

The Cougar project deliverables are provided at the end of each year's program, at the annual meeting, and include, for each item developed during the program:

- presentation of research methodology;
- software prototype modules if applicable;
- training on the software prototype modules;
- presentation of the validation studies performed on synthetic and/or real field case studies provided by Cougar 3 partners;
- reports on methodology, user manual and tutorial for software prototype modules, validation studies.

At the end of the first year, software prototype modules on:

- "advanced methods to build RSM";
- "integration of data for mature field";
- "selection of confirmation runs to check RSM quality".

At the end of the second year, software prototype modules on:

- "uncertainty management for static modeling";
- "taking time explicitly into account in the RSM";
- "enlarge the workflow to extend up to surface network modeling".

At the end of the third year, software prototype modules on:

- "combining the uncertainty of static and dynamic models";
- "management of uncertainties using attributes".

The software prototype modules will be compatible with the industrial Cougar™ software.

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