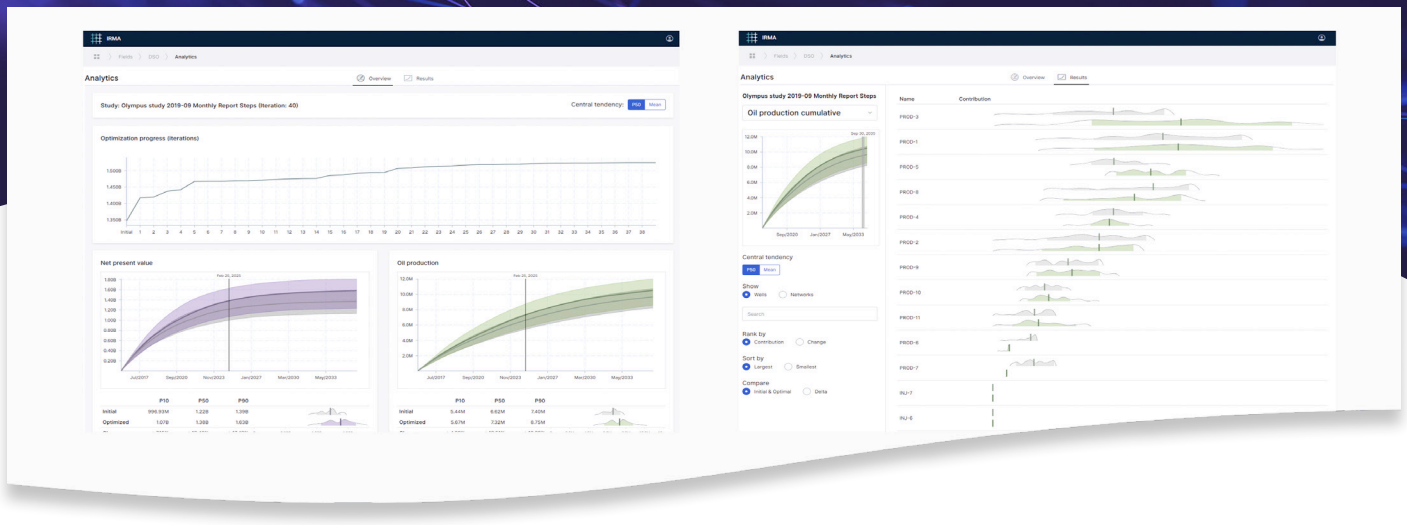
Resoptima

Making Better Decisions Under Uncertainty
Olympus Field Challenge



Improved understanding of drainage patterns increases expected net present value by 9 %

Objective

Optimize the drainage strategy of the Olympus field under uncertainty, and compare results with the reactive control drainage strategy

Solution

IRMA Drainage Strategy Optimization (DSO) application - utilizes an ensemble of models and fit-for-purpose algorithms to increase your understanding of the risks and opportunities in the subsurface.

Outcomes

- Identified 6 high risk targets that should be reconsidered.
- Increase expected net present value compared with the reactive control strategy by 133 MUSD.
- Increased expected value per well by 48 %.

Incorporate uncertainties

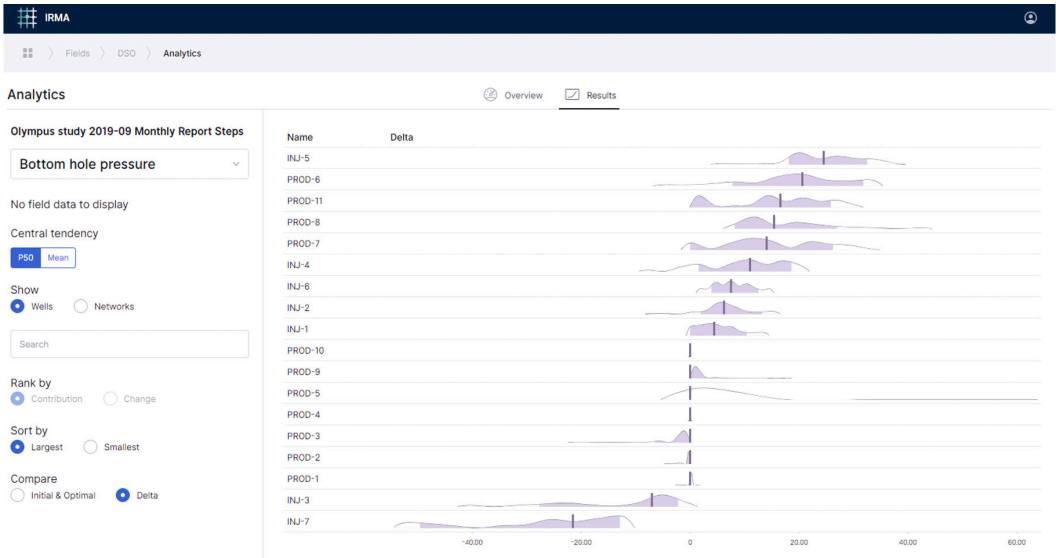
It is widely recognized that relying on a single (best case) model for predicting and optimizing future reservoir performance is not robust. To make better decisions, there is a need to incorporate subsurface uncertainties throughout the reservoir modelling, data conditioning and reservoir management processes.

Lack of streamlined tools and time constraints, however, usually means that this exercise is curtailed to exploring at most a few cases and development options, or, even worse, just using modelling as a way to validate decisions that have already been taken. Ultimately, this limits the value of the considerable time and effort that go into producing models, but also represents an opportunity to do more when presented with the right tools..

The IRMA Drainage Strategy Optimization (DSO) application enables asset teams to arrive at new insights and development options that ultimately increase the value of the field.

Ensemble based reservoir management

The DSO application does not rely on a single or selection of cases, but rather an ensemble of models. This allow asset teams to continuously work on identifying potential risks and opportunities - while capturing the subsurface uncertainty. This was highlighted on the Olympus field challenge where net present value was increased, but more importantly demonstrated how the solution can be used to identify low-value/higher risk targets whose contribution to reservoir recovery is questionable. Thus, the learning from the optimization can be used to explore alternative – even higher value – development scenarios for the Olympus field.accounting for all static and dynamic data in a consistent manner across the modeling chain. Adding to this the combined expertise of the subsurface team led to an improved understanding of the field.



The drainage strategy optimization solution identifies six high-risk/low-value targets on the Olympus field. Exploring an alternative scenario where these six targets are not drilled shows a significant value increase compared with the reactive control (base) strategy.

Solution Highlights

- Optimize expected net present value in an ensemble of 50 pre-generated reservoir models, changing water injection rate in 7 injectors and 11 producers every two years. Expected NPV increase approximately 3 % compared with the reactive control development strategy.
- More importantly, the solution identifies 6 low-value/high-risk targets:

  1) 3 with limited or no value as the solution detects that the optimal solution is to switch them off.

  2) 3 with large risk of negative cash flow, when considering the cost of drilling these wells.

- Running a second scenario where we do not drill these 6 low-value/high-risks targets reveals:

  1) 163 MUSD (34 %) reduction in capital expenditure compared with the base development strategy, optimizing the placement of the platform and the wells with respect to cost of drilling.

  2) Expected value per well increase from 82 MUSD to 121 MUSD compared with the base development strategy.

  3) Expected net present value of the Olympus field increase from 1480 MUSD to 1610 MUSD by reducing the number of drilled wells and operating them smarter.

- Additional value is likely to be attained by exploring alternative well targets that can replace some or all the identified 6 high-risk/low value ones given the current platform capacity and available well slots.

For more details check out SPE 196683

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