CASE STUDY · CMG COUPLING

DEEPSOFT

01/07

IMEX, GEM and STARS, as if Petrel had always supported them

A coupling layer that turns the CMG family into first class simulators inside Petrel, built on the official Ocean mechanism for third party simulation.

CLIENT	PART OF	STACK
Petrobras	BR-Kalman, as a module	Ocean · C# · .NET · C++

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A simulator portfolio, and a platform that knew only part of it

02/07

Petrobras runs a diverse portfolio of reservoir simulators. The CMG family carries the studies where the physics gets demanding: enhanced recovery, heavy oil, compositional simulation.

Petrel supports some commercial simulators natively. For the CMG family it needed a dedicated coupling layer, one that translates the reservoir model into CMG input and brings results back into the project.

IMEX

black oil

GEM

compositional

STARS

thermal and chemical processes

enhanced recovery, heavy oil

Fig. 01 · The three engines covered by the coupling layer.

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Every manual step is a place where the model and the results drift apart

Driving an external simulator by hand means exporting the model, editing the deck outside the environment and importing results back. Traceability breaks, and any workflow with many runs becomes impractical.

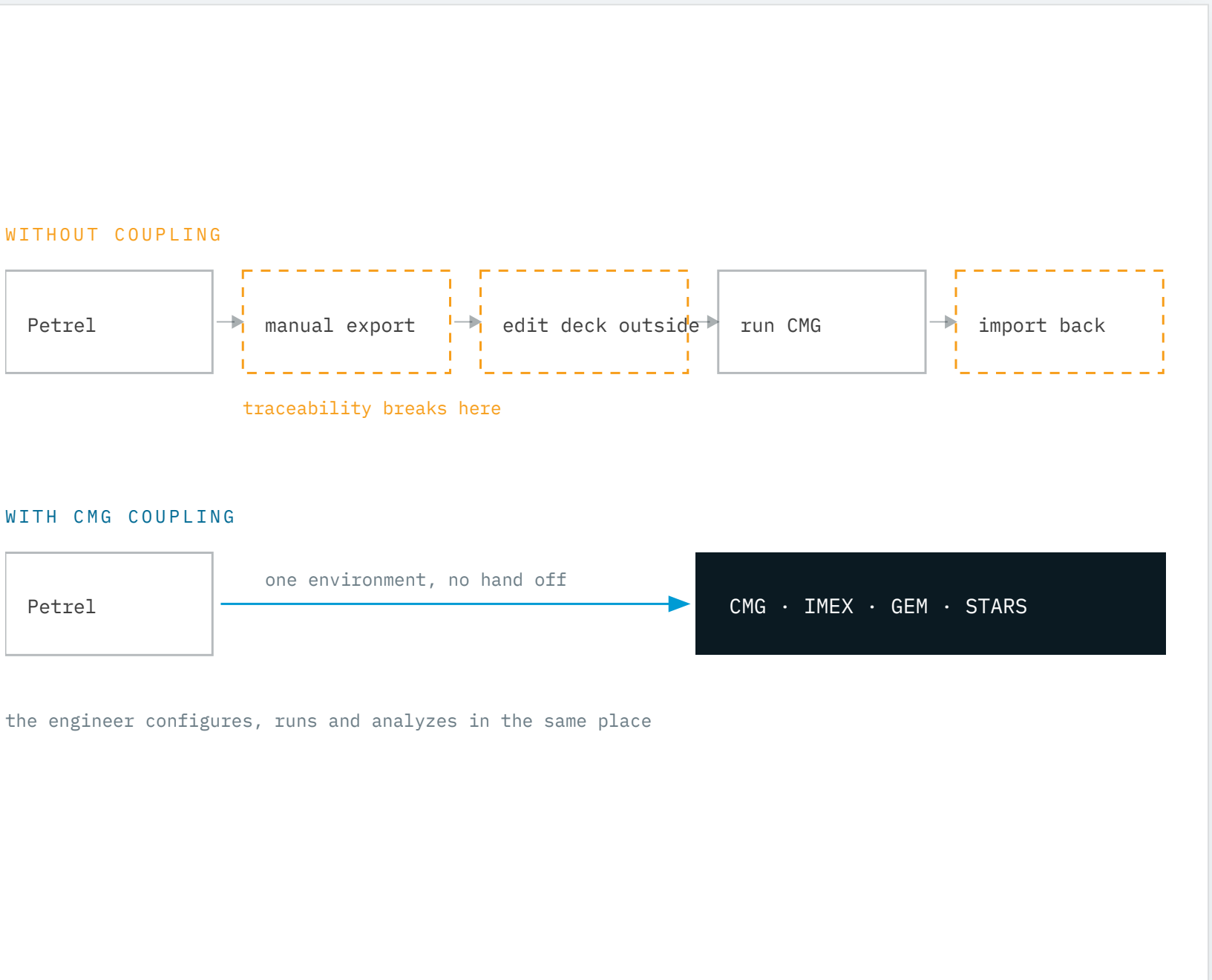


Fig. 02 · Schematic. Without coupling, ensemble runs with CMG simulators are simply not viable.

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Translation in both directions, on the official Ocean mechanism

CMG Coupling sits on Third Party Simulation, the SLB architecture for bringing external simulators in as first class citizens. It converts Petrel structures into CMG decks, runs the simulator under control, and reimports the results.

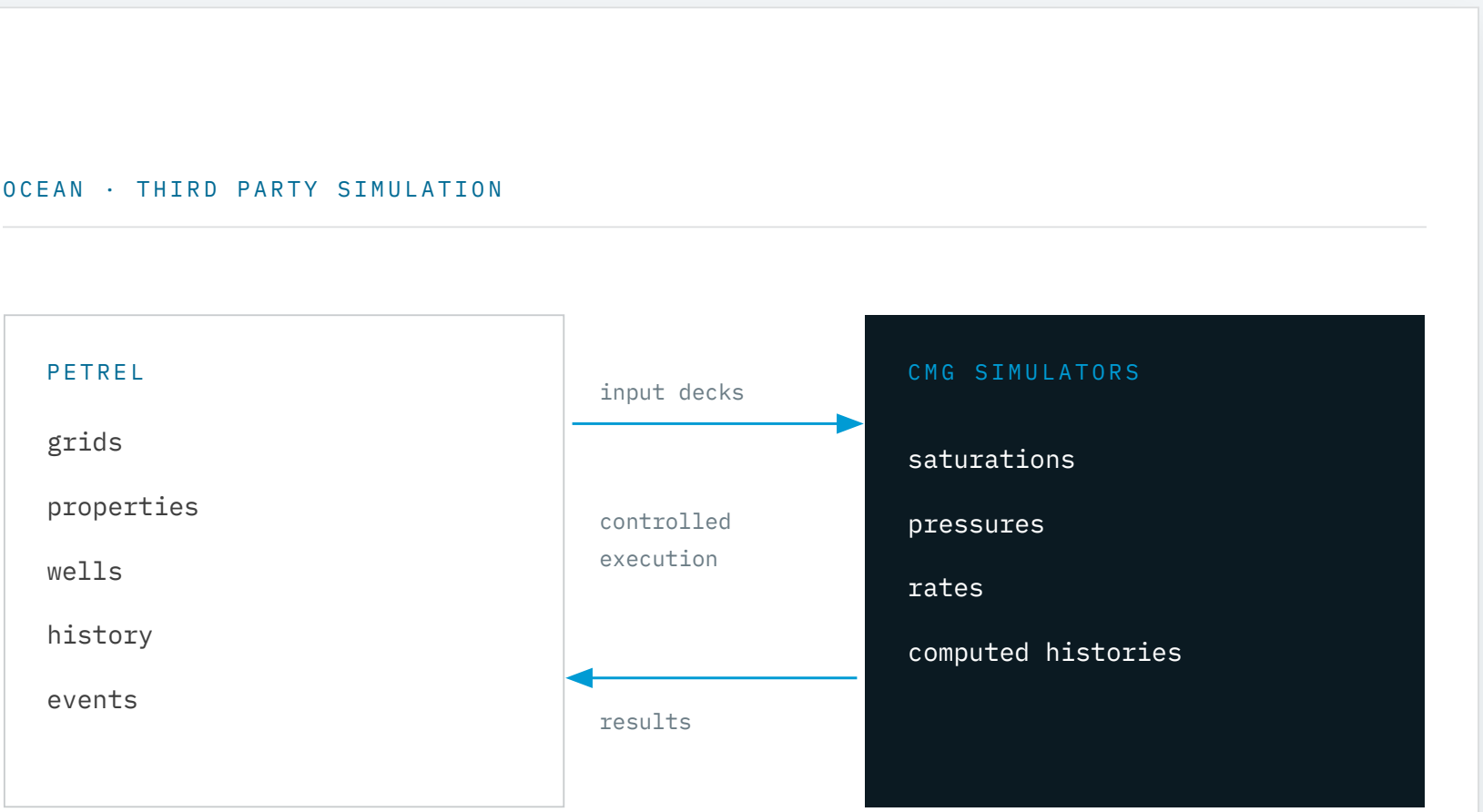
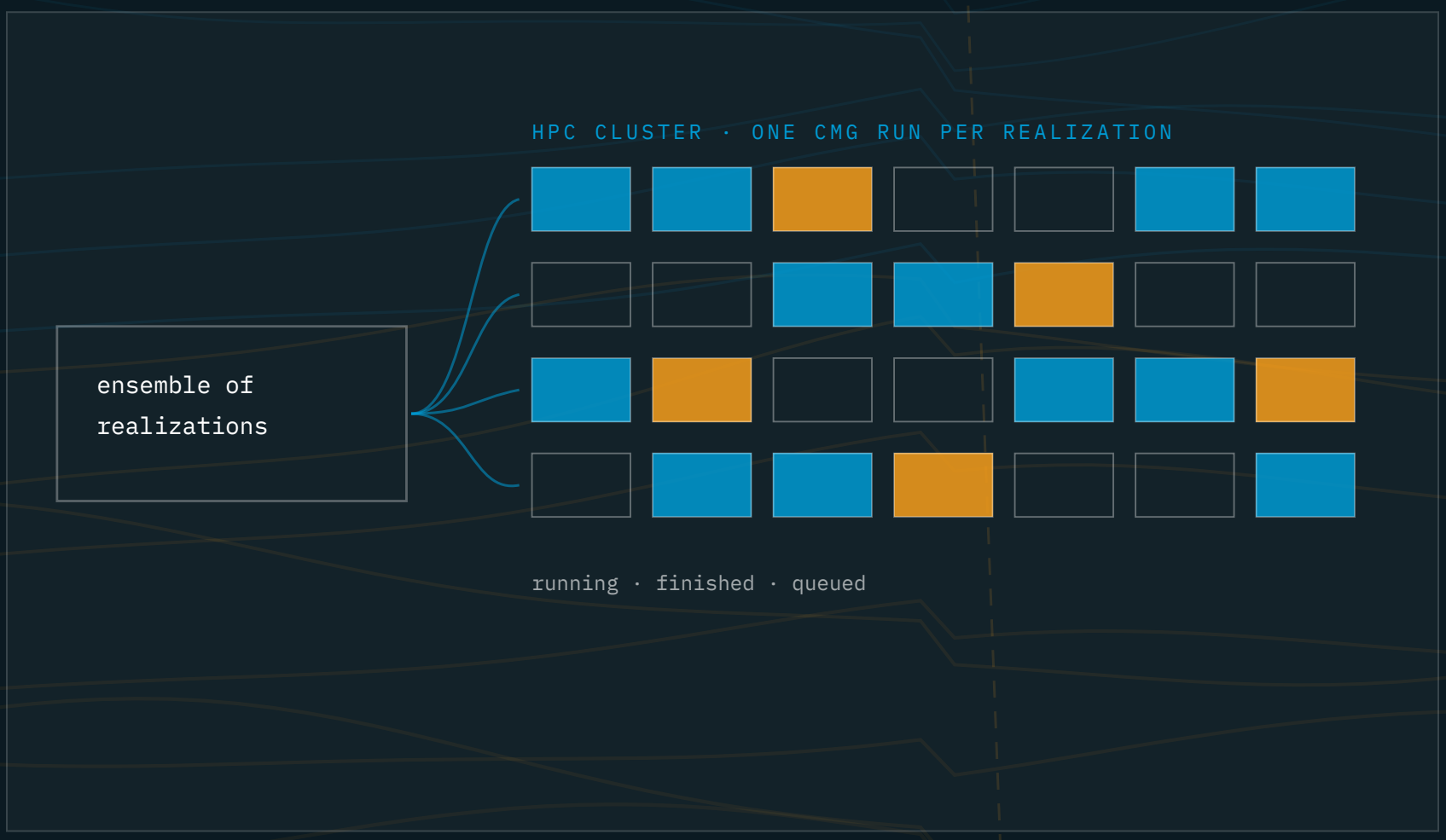


Fig. 03 · Schematic. The engineer configures, runs and analyzes CMG simulations without leaving Petrel.

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One realization is a simulation. Two hundred is a workflow.

As a BR-Kalman module, CMG Coupling dispatches hundreds of realizations in parallel on HPC clusters. Ensemble based data assimilation depends on exactly that, and without the coupling layer it would not run at all. The module also runs in the SLB DELFI environment, so the ensemble can be dispatched from the local installation or from the cloud.



OCEAN THIRD PARTY SIMULATION

CMG IMEX · GEM · STARS

HPC CLUSTERS

DELFI READY

Fig. 04 · Schematic. Each realization becomes a CMG run, dispatched and tracked from Petrel.

RESULTS ACHIEVED

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What the coupling layer delivered

CMG as a native simulator

IMEX, GEM and STARS run inside Petrel as first class simulators, with no manual exports and no deck editing outside the environment.

BR-Kalman compatibility

The module puts CMG simulators inside data assimilation workflows, with ensembles running in parallel on HPC clusters.

Traceability end to end

Petrel itself keeps the geological model, the simulation deck and the results coherent, which cuts operational error and preserves the project history.

0
500
1000
1500
2000
06/07
2500
RESULTS
3000

> Because the coupling sits on the official Ocean mechanism, CMG behaves like a native simulator inside Petrel rather than a workaround bolted to the side of it.

Integration work is invisible when it is done right. That is the point.

CMG Coupling is being developed in partnership with Petrobras, as part of the BR-Kalman project with CENPES. The coupling layer is engineered by DeepSoft.

CMG Coupling itself is Petrobras software. What DeepSoft offers is the engineering: Petrel plug ins and coupling layers for teams that already own the science and need it to run where the decisions are made.

SERVICES

Petrel plug in development

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Ocean Third Party Simulation · C# · .NET · C++