

IRMA

A toolkit to drive value from ensembles of reservoir models

Devex 2020- Techbyte Presentation
23 September 2020



Resoptima

IRMA: Integrated Reservoir Management and Analytics for Ensembles



MOTIVATION

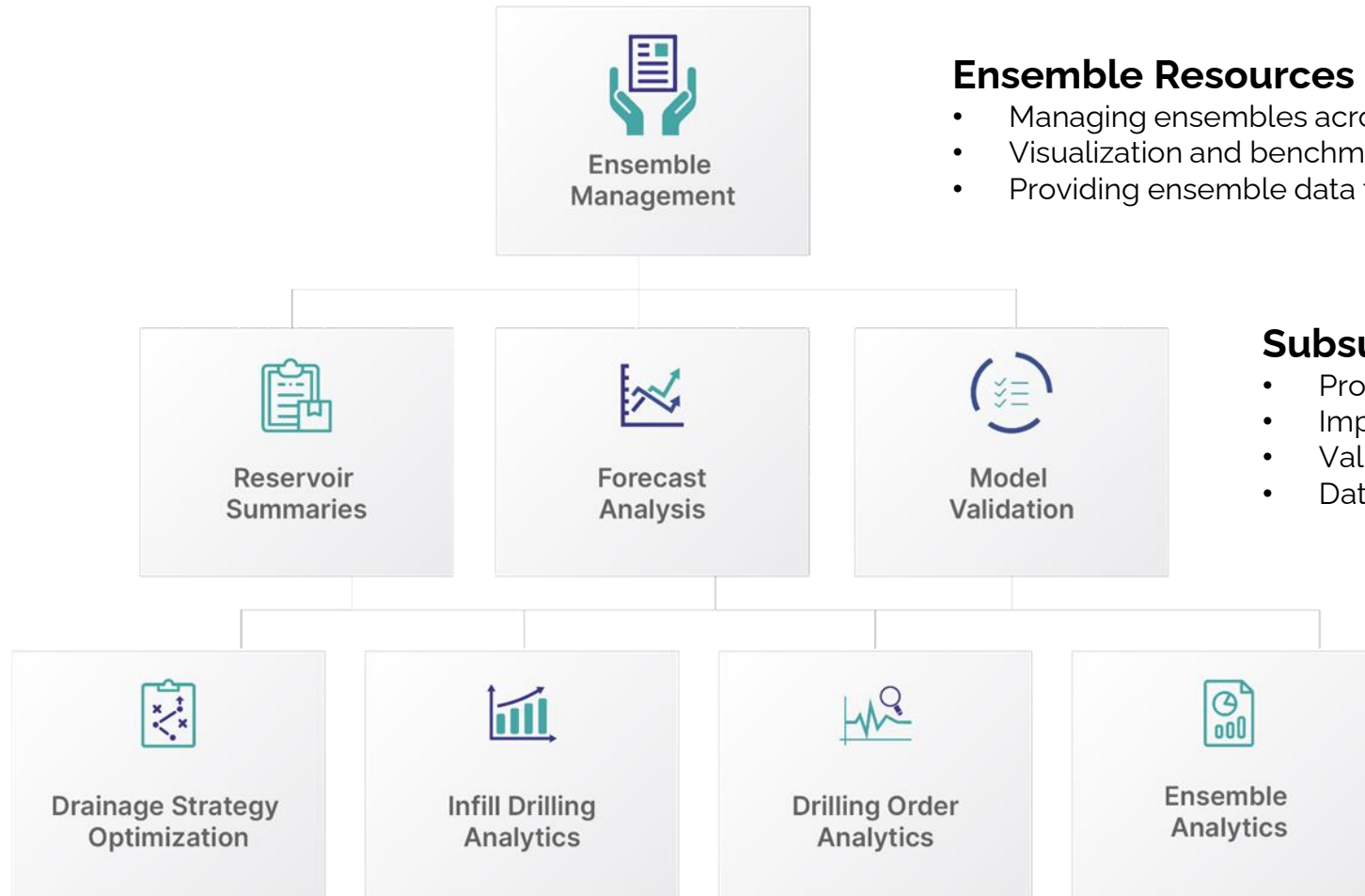
Modelling software is a single-user paradigm

Established modelling “best” practice is case-centric instead of uncertainty centric

Peers, partners, and management unfamiliar with ensembles

Planning decisions differ according to asset requirements and lifecycle phase

- Monolithic tools are a barrier to efficient work practice
- Modelling software requires expertise/time/etc. to use
- Working with 100+ models needs to be as comfortable as working with a single model.
- Transition from R&D to supporting modelling work and decision making requires ensemble results to be communicated appropriately to each stakeholder
- Don't assume that development decisions are universal
- Build focused tools and supporting algorithms which are fit for purpose



Ensemble Resources Management

- Managing ensembles across all assets
- Visualization and benchmarking
- Providing ensemble data to all applications

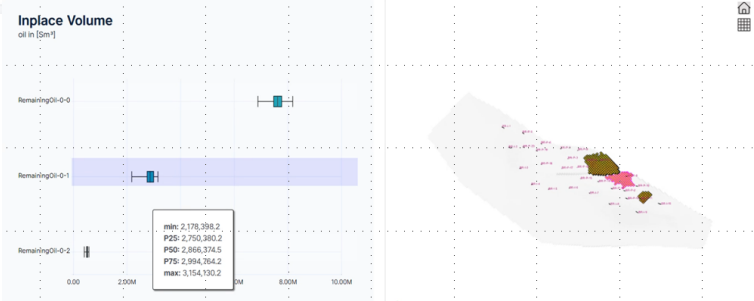
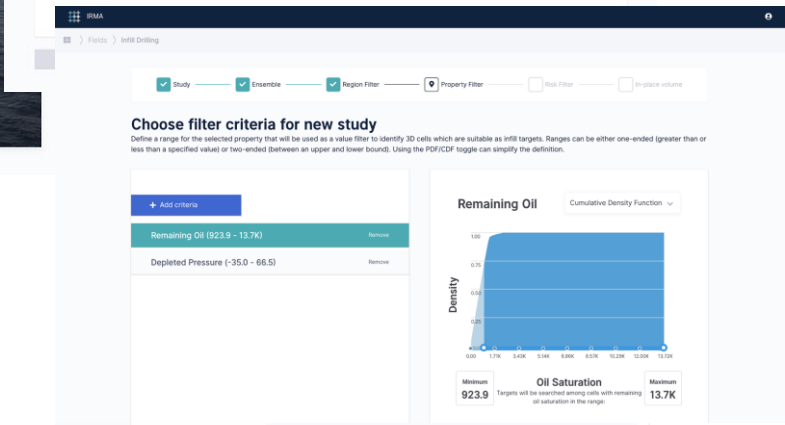
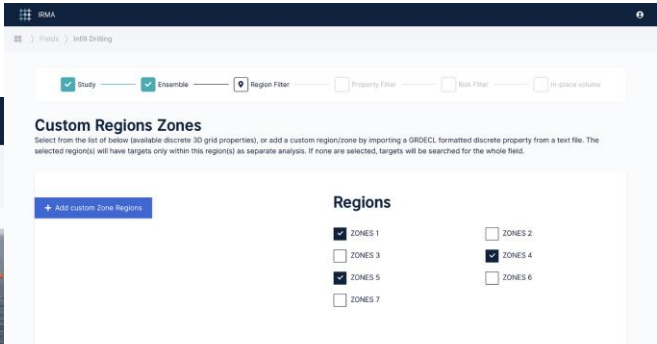
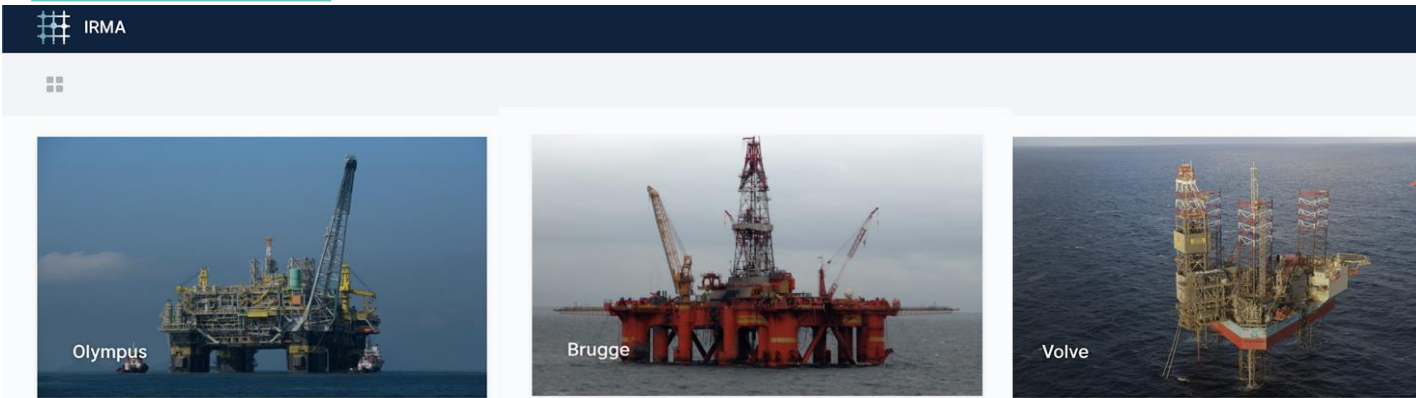
Subsurface Analytics

- Production insights
- Improved forecasting
- Validation of existing reservoir models
- Data-driven reservoir decisions

Domain Applications

- Maximizing production and NPV while honouring economic, operating and well constraints
- Data-driven IOR support
- AI and ML support to reservoir modelling

IRMA Infill drilling analytics



Select application

Ensembles

Drainage strategy optimization

Model validation

Lab

Ensemble analytics

Infill drilling analytics

Guided workflow



Study



Ensemble



Region Filter



Property Filter



Risk Filter



In-place volume

Ensembles



Search Ensembles

Brugge 2019 M4

...

Date 05/07/2020

Created By

Select

INFILL_DEMO

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Date 05/21/2020

Created By RESOPTIMA\mst

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brugge_3

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Date 05/13/2020

Created By mst@resoptima.com

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BRUGGE_TEST1

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Date 05/13/2020

Created By mst@resoptima.com

Select

Guided workflow



Study



Ensemble



Region Filter



Property Filter



Risk Filter



In-place volume

Choose filter criteria for new study

Define a range for the selected property that will be used as a value filter to identify 3D cells which are suitable as infill targets. Ranges can be either one-ended (greater than or less than a specified value) or two-ended (between an upper and lower bound). Using the PDF/CDF toggle can simplify the definition.

+ Add criteria

Depleted Pressure

Remaining Oil

Recovery Factor Oil

Back

Proceed

Guided workflow



Risk Filter

Use a probability threshold for the selected property filter to amend the targets based on your risk preference. The targets on the right reflect the areas where the probability value for the entire ensemble is greater than or equal to the threshold selected. Lowering this threshold will increase the size of potential targets, but also increase the risk.

Depleted Pressure



High Risk Probability threshold Low Risk

Remaining Oil



High Risk Probability threshold Low Risk



Properties

☐ Depleted Pressure

☒ Remaining Oil

Guided workflow

☒ Study

☒ Ensemble

☒ Region Filter

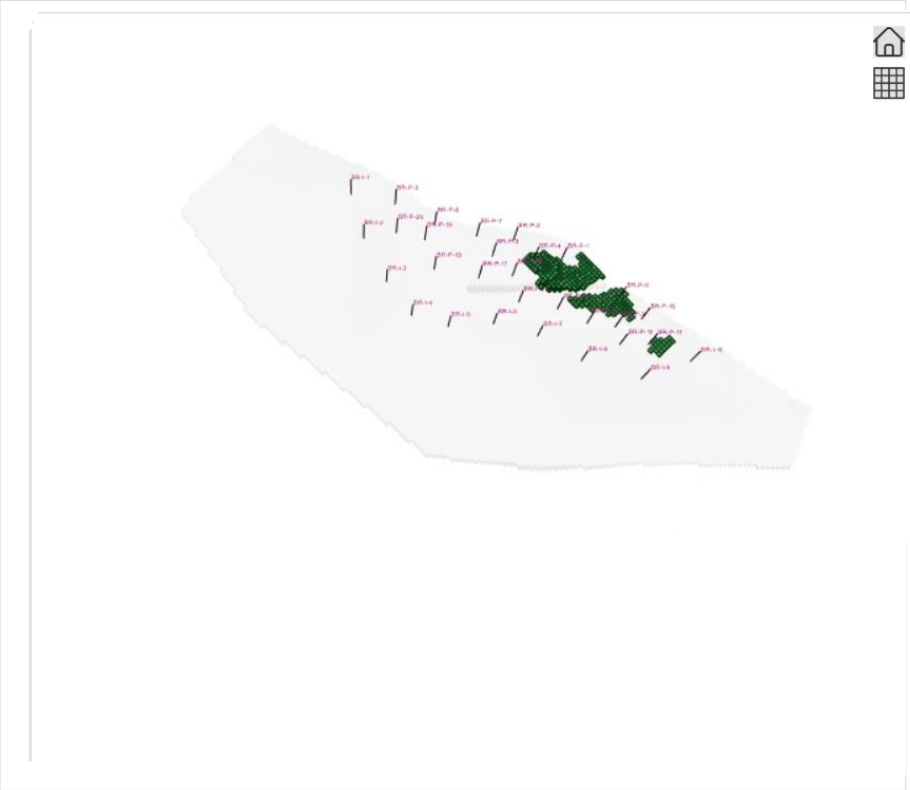
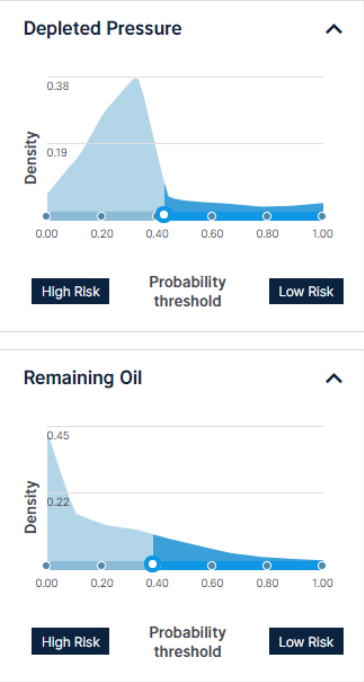
☒ Property Filter

☐ Risk Filter

☐ In-place volume

Risk Filter

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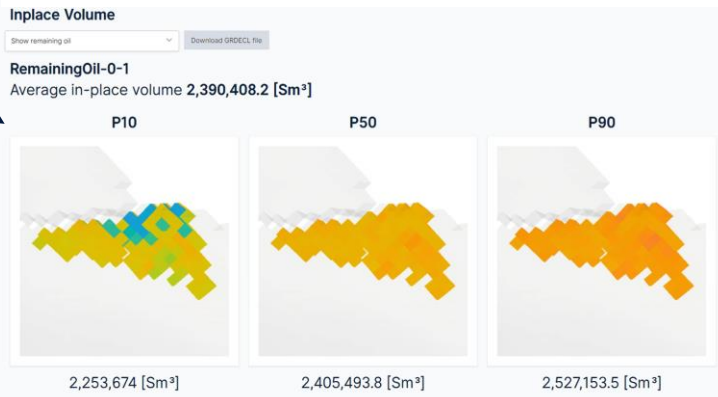
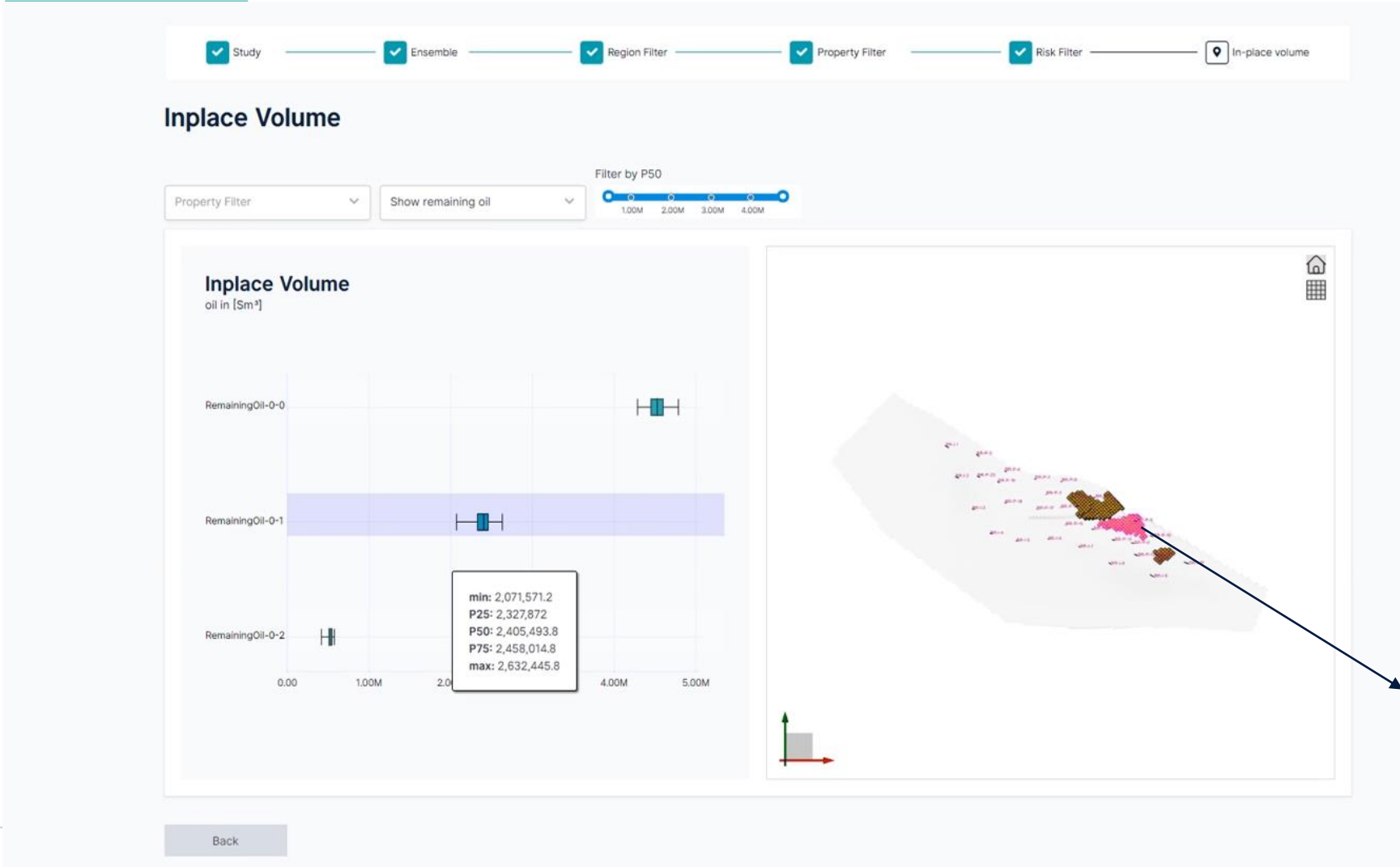


Properties

☐ Depleted Pressure

☒ Remaining Oil

Guided workflow



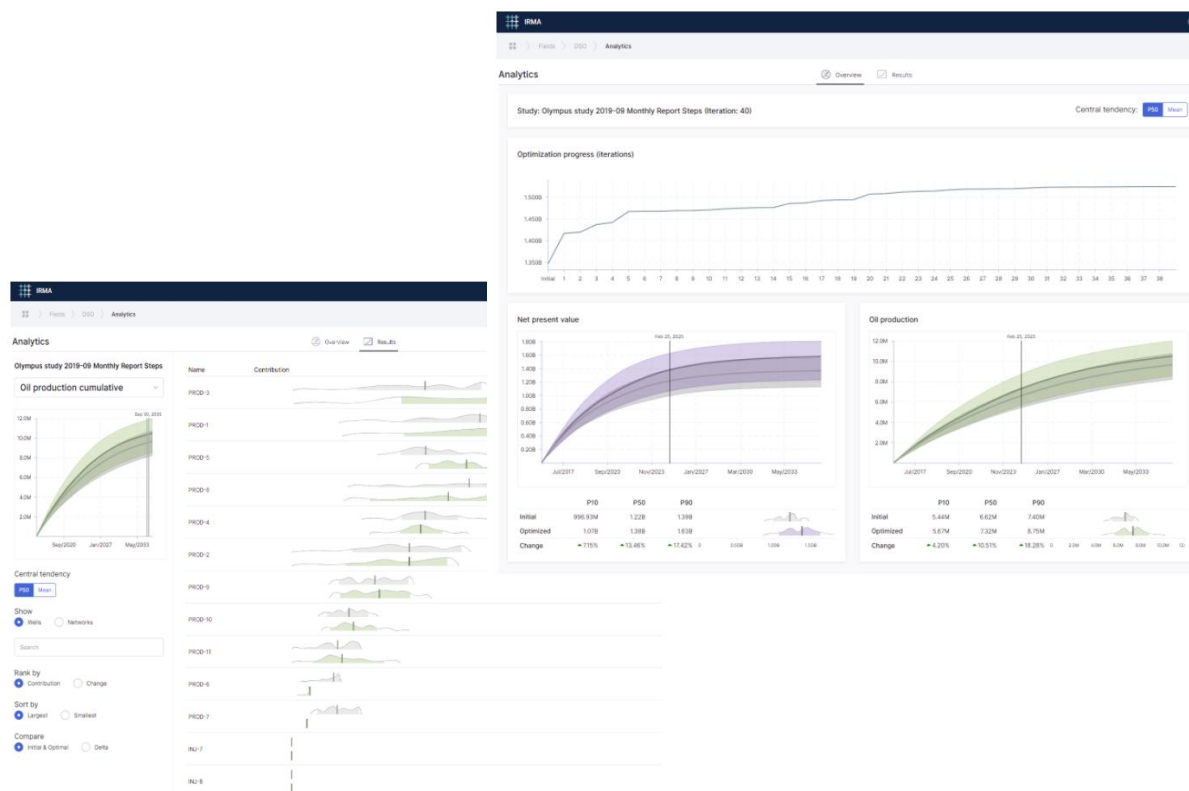
Other applications

Fit for purpose and flexible



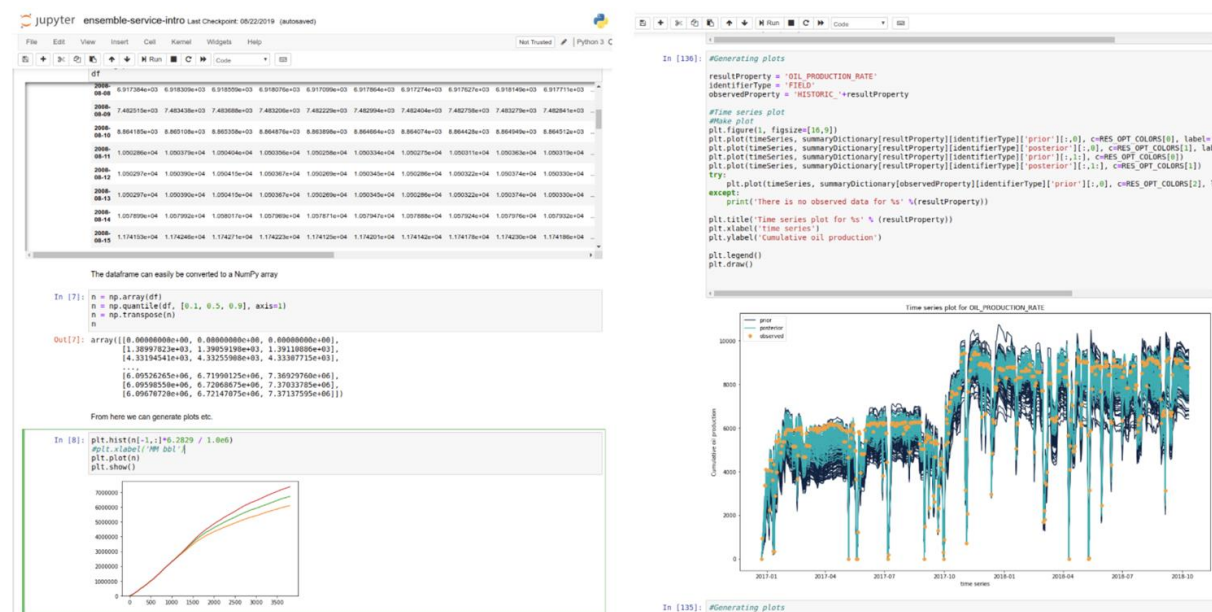
Drainage Strategy Optimization

- Optimize your development plan
- Designed to be flexible



IRMA Lab

- Your analysis and algorithms
- All your ensemble data
- Open and extensible



Conclusion

IRMA BENEFITS

- Working with an ensemble requires tools that are fit for purpose
- Using case-centric monolithic modelling tools reinforces the practice of trying to make a best technical case. IRMA can help break this cycle, by “liberating” ensembles
- Modelling with an ensemble will represent the reservoir and its inherent uncertainty and provides a robust framework for assessing decisions
- Targeted fit-for purpose applications can be easily built and quickly deployed
- Users have access to all their data to analyse in a way that is natural to them and to communicate with the team/decision makers

ResX and IRMA

A FAST, INTEGRATED AND ITERATIVE APPROACH

