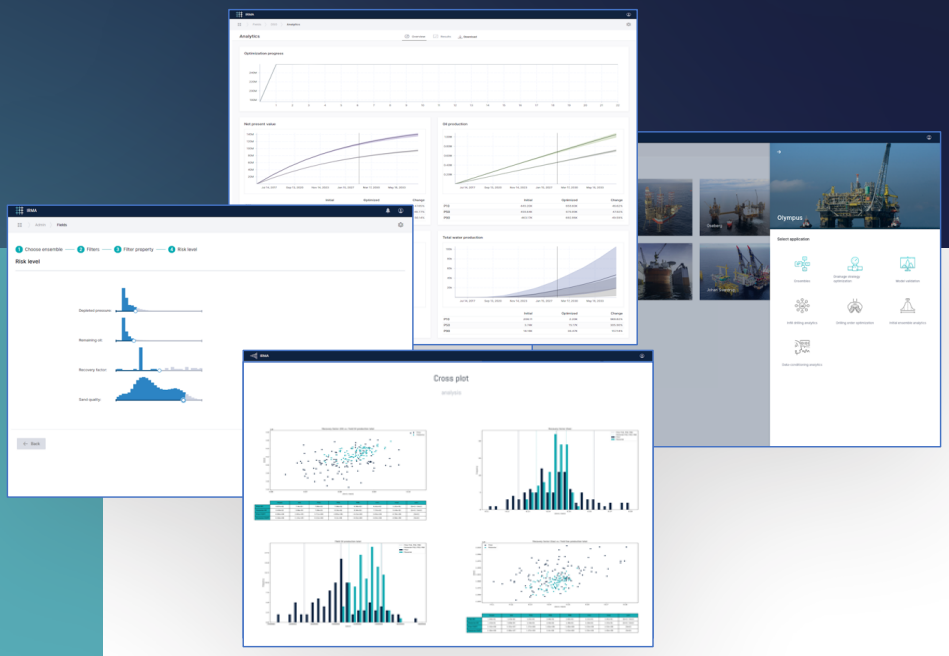
IRMA

A new era in ensemble-based reservoir modelling and analytics



Seamless integration with ResX for closed-loop , rapid and continuous learning

IRMA is created by Resoptima, the global leader in uncertainty-centric, ensemble-based reservoir modelling and data conditioning. Drawing on years of experience from ResX users around the world, IRMA applications have been developed in close cooperation with industry partners.

Handles ensembles as cohesive units, not collections of cases

IRMA is designed to handle each ensemble of reservoir models as a cohesive, integrated representation of the reservoir under uncertainty. IRMA implements an uncertainty-centric paradigm to reservoir management and analytics.

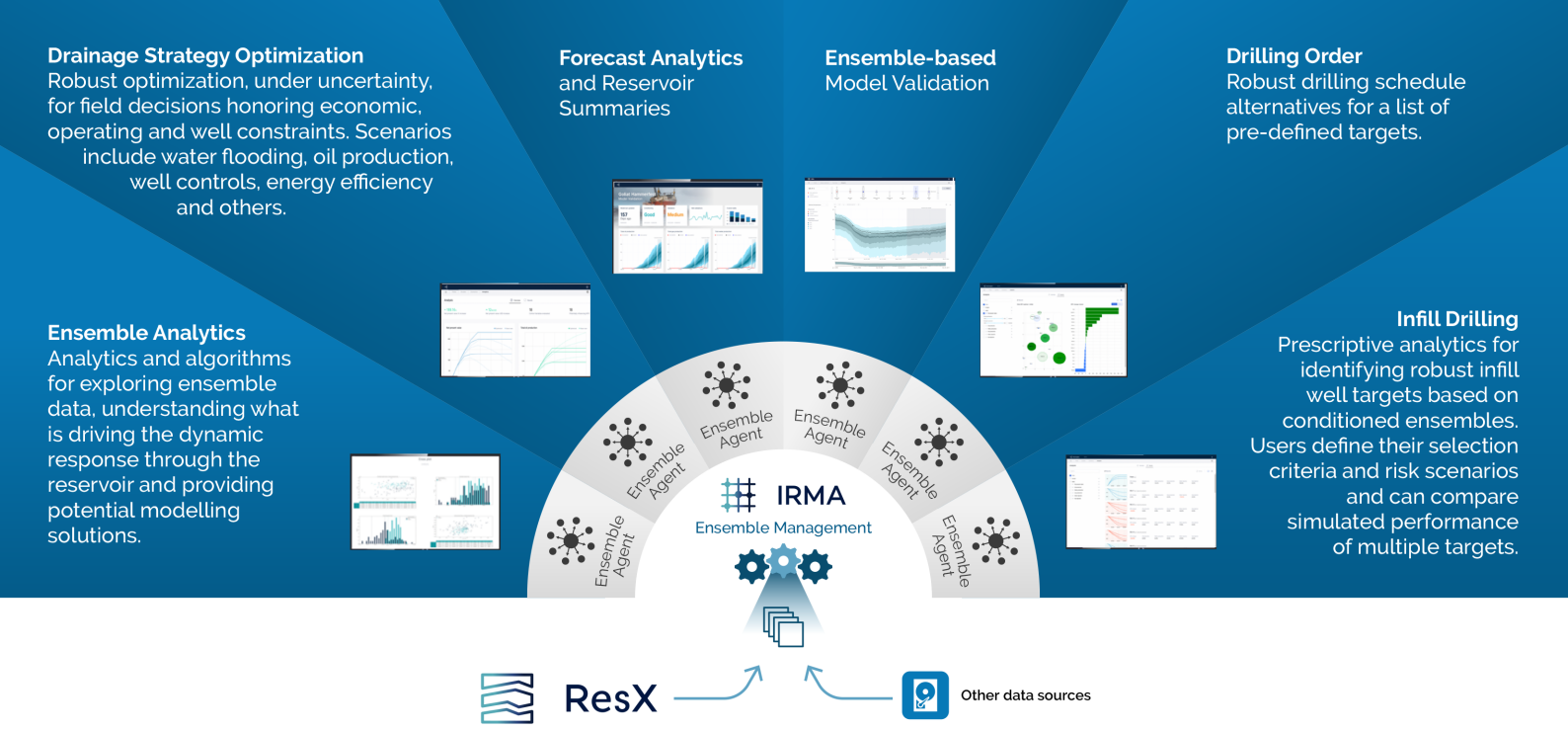
IRMA is an integrated family of digital tools and applications for visualizing, analyzing, exploring and driving value from ensembles of reservoir models.

IRMA applies prescriptive analytics, data exploration, machine learning and visualization techniques to enable E&P companies to utilize ensembles of models to explore the subsurface, identifying new opportunities and associated risks.

IRMA automatically ingests and manages ensemble data from ResX and from other sources (OSDU-compatible data sources, Petrel®, Cognite Data Fusion™, legacy text files) and coherently manages each ensemble as an integrated model of the reservoir under uncertainty.

The power of ensemble-based reservoir modelling is well-known in the industry. Using ResX, companies are able to compress by 90% or more the time needed to go from subsurface data to fully conditioned ensembles of reservoir models that simultaneously assimilate and honor all available static and dynamic reservoir data.

However, the most popular geo-modelling and reservoir engineering software packages have not been designed with ensembles in mind and advanced tools were needed to handle ensembles as cohesive units, extracting the full benefit of the aggregated statistics of the models and providing specific ensemble-oriented analytics. IRMA is the solution.



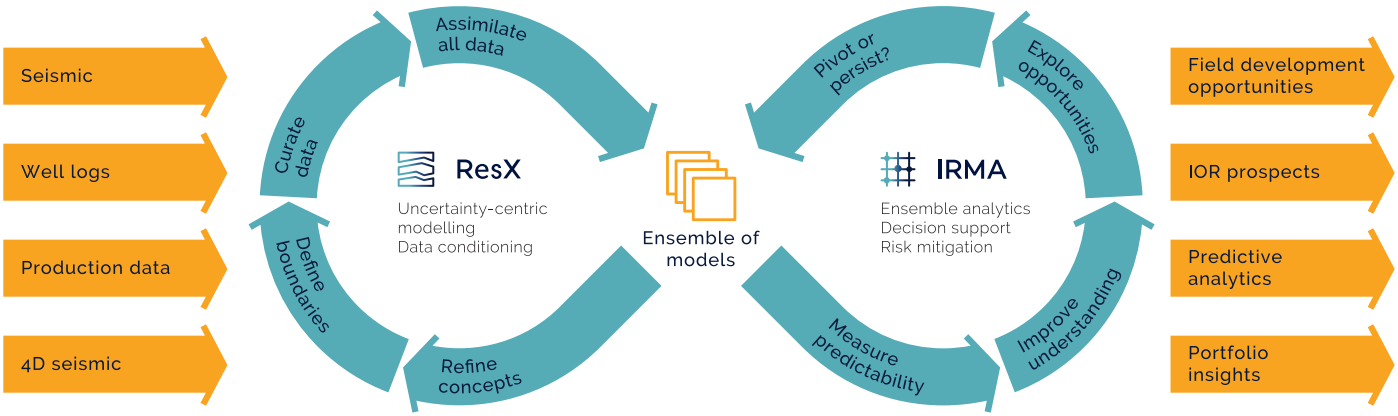
IRMA – integrated reservoir management and analytics from the world leaders in ensemble-based reservoir modelling

Resoptima is the world leader in ensemble-based reservoir modelling with ResX, the only commercially available reservoir modelling tool capable of assimilating all static and dynamic reservoir data simultaneously in a unified, uncertainty-centric step, with no loss of data or information.

After several years of successful ResX deployments, Resoptima is now launching **IRMA**, an integrated environment for ensemble visualization and analytics, decision support and risk mitigation.

IRMA handles, visualizes and explores ensembles of reservoir models as if they represented a single model of the reservoir under uncertainty. With IRMA, the tasks of forecasting, optimizing, exploring opportunities, improving the understanding of the reservoir and developing insights for improving the models are made easy.

Powered by the most advanced algorithms for ensemble-based modelling and analytics, including graph networks, stochastic optimization and other ML methods, ResX and IRMA deliver speed, control and power to look at all available data as a whole, immediately assessing how modelling choices and data interpretation affect the resulting ensembles of models and enabling teams to iterate quickly and continuously learn and improve.



Together, ResX and IRMA deliver an uncertainty-centric approach based on an end-to-end integrated and automated workflow that quickly closes the loop between input data and simulation models and provides analytics for insights and decision support.

IRMA

Open, microservice-oriented systems architecture

IRMA is an open application based on a microservice-oriented architecture. The micro-services can run on all types of cloud-based architectures (open, private, hybrid) as well as on premise. The services connect to data sources via open APIs and are accessed by users through a modern web-based interface.

Integrate ensemble and subsurface data as well as simulation capacity from multiple sources

In addition to providing auto-matic integration with ResX for ensemble data, IRMA provides adapters for other data sources (OSDU, Petrel®, Cognite Data Fusion™, legacy text files). IRMA also enables users to connect to multiple reservoir simulator infra-structures to provide simulation capacity.

Ensemble management, visualization and analytics made easy for an uncertainty-centric approach

IRMA Ensemble Manager

All your ensembles orga-nized and easily accessible through one common inter-face. Quickly explore your existing ensembles for each field with simple access to metadata, tags, context and properties. Share your work with other IRMA users and launch other IRMA appli-cations for your selected ensembles.

IRMA Ensemble Analytics

Automatically explore ensembles, extracting key statistics, highlighting the drivers for the dynamic response throughout the reservoir and identify-ing potential modelling solutions. Perform quality assurance against static and dynamic input data to detect potential inconsis-tencies in the ensembles.

IRMA Drainage Strategy Optimization

Use fit-for-purpose machine learning algo-rithms to explore how to further improve recover-able volume, net present value, and/or reduce CO_2 emissions while accounting for the uncertainty in the subsurface. Evaluate the full potential of different development options, with their associated risks and opportunities.

IRMA Forecast Analytics

Allows users to evaluate future reservoir perfor-mance while incorporating uncertainty in the prediction strategy, such as uptime fraction and drilling sched-ules. Simulate, explore and compare the robustness of different development sce-narios should unscheduled events occur.

IRMA Model Validation

Quantify and monitor the predictive power of a condi-tioned ensemble of models through a graphical analysis of discrepancies between simulated forecasts and observed production data. Users can drill down on indi-vidual reservoir parameters to measure predictability and improve understanding.

IRMA Lab

An open and extensible environment based on the Jupyter™ Notebook, enabling users to integrate all available ensemble data with popular data science languages (Python, R, Scala) and third-party libraries (MLlib, NumPy, SciPy, scikit-learn,and pyc3) to experiment and develop algorithms.

IRMA Infill Drilling Analytics

A prescriptive analytics tool for automatically identify-ing robust infill well targets based on ensembles of models. Users define well target selection criteria based on reservoir prop-erties and get feedback on the associated risk. Identified targets are ranked according to their added value potential and risk.

IRMA Drilling Order Analytics

Leverage the ensemble of models to identify robust drilling schedule alterna-tives for a list of predefined targets. Explore scenar-ios for how many wells to drill and when to drill them, taking into account the uncertainty of the subsurface.

IRMA Reservoir Summaries

A visual interface for viewing and analyzing reservoir performance indicators based on the ensemble of models. Presents summary information such as reserve estimates, in-place volumes and production forecasts, as well as the validity of the current ensemble and potential development opportunities.

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