

## **iBasin, a New Paradigm for Basin Modeling Software**

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### **ABSTRACT**

In this talk, we will review the capabilities of Basin Modeling software with regards to the current challenges of exploration of geologically more and more complex systems in order to draw new concepts and propose new ideas for flexible collaborative exploration toolbox, based on an holistic view of sedimentary basins interpretation.

**Technical software** used in E&P are more and more complex while requirements for flexibility are increasing. Driven by massive increase of amount and quality of available digital data such as seismic surveys or well log datasets together with the development of processing numerical techniques, the number, diversity and complexity of functionalities available to the geoscientist is exponentially rising. From fast-track simple 1D to high CPU demanding 3D simulators, the available disconnected tools are missing their target to support Exploration decision. It's time to fundamentally redesign the E&P Exploration digital toolbox.

The explosion of seismic acquisition and processing techniques submerges geologists with new images thus exploration has focused on exploitation of seismic data (imaging, inversion, DHIs...). At the same time new data types (non seismic physics, well data paleomarkers...) and new concepts (derived from the global geodynamics scale to the small scale fluid-rocks interactions for example) are frequently unexploited or misused. Based on the huge amount of image data to interpret, exploration is still driven by analogy that do not focuses much on the integration of interpretation of various data types. Therefore the basin models are more and more refined on the geometry, kinematics and deterministic description of basin material content. In the meantime, lots of progress has been made on physical explanation and quantification of elementary geological processes. At the same period, numerical simulation techniques have tremendously evolved with new numerical schemes allowing massive coupling but also with the incredible increase of processing power of the infrastructures.

How to reconcile improvement of numerical technologies, emergence of new coupling techniques, new physical formulations of diverse geological processes, richness of datasets, and operational need for flexibility, simplicity and fastness in basin modeling software?

**The challenge: simulating while interpreting.** At the difference of reservoir modeling where the target is to be as close as possible of the reality from which we own a reasonable amount of evidences (HR seismic, explo and appraisal wells, ...) in order to be able to extrapolate the best simulation of a short term production period, the exploration basin modeling requires to provide risking parameters of the prospectivity of a volume of earth from which the data base is weak. Here the modeling target is to test the physical consistency of multiple interpretation scenarios by simulating geological behavior of the sedimentary basin.

**The earth is a whole and the basin modeling should tend to be holistic.** The way of success in sedimentary basin exploration is therefore to gather most of the knowledge in one single model. This model's fundamentals are its capacity to embed a description of the interpretation of

the basin shared by an exploration team, allowing to test and validate the interpretation scenario by simulating its physical behaviors consistency hence providing with reliable elements for decision.

The usual way of basin evaluation is to process and interpret data by analogy. This was useful until most of the basins and plays were not intensively explored. This is less the case at present time where the way of success is to identify new “tricky” plays. A new petroleum play might be designed by identification of a coupling of geological conditions and processes that has not yet been described nor validated. An efficient way to de-risk such a new play is to simulate this coupling with a basin modeler.

Thus the future of exploration toolbox is to ease collaborative expression, testing and physical validation of many scenarios than digging in a single but possibly incorrect interpretation.

Some insights of the **iBasin concept**, a flexible multi-skill collaborative real time coupled multi-process Exploration Basin Model will be presented.