Big Loop
Better Business Decisions through Accurate Uncertainty Assessment and Reliable Production Forecasts

In fast-paced environments, critical field development decisions require seamless collaboration. A unified, reservoir model based on a collaborative approach between multi-disciplinary experts is therefore of immense value.

The answer to this challenge is Emerson E&P Software’s Big Loop™, an open ecosystem for setting up automated, reproducible, and auditable ensemble-based workflows. The workflows help propagate uncertainties and capture their dependencies, resulting in reliable probabilistic predictions. Easy to update, they enable asset teams to spend more time analyzing the results and building a common understanding of the reservoir.

In Big Loop, subsurface uncertainties captured at every stage of the modeling process are used as inputs within a repeatable workflow. By adjusting these inputs, an ensemble of models can be created via an iterative loop, with their likelihoods constrained by production history and other data. The result is a ready-to-analyze flow model calibrated to multiple geophysical, geologic and production data, ensuring consistency with the underlying geology.

The results provide valuable input that enables asset teams to make recommendations for:

- Exploration and appraisal
- Field development
- Field production
- Advice to Business Units

The Big Loop workflow is open and scalable, running on-premises or on the Cloud, from PC to HPC.

![Big Loop](image)

> Big Loop is a digital transformation solution - higher efficiency with less effort

**An ensemble solution: Propagate uncertainties from where they apply to where they matter, for better decision-making**

Big Loop is able to capture, preserve and propagate uncertainties throughout the workflow: in seismic interpretation, well picks and petrophysical logs, well trajectories, velocity and structural models, and property and petrophysical models. All of the uncertainties are honored and used to generate multiple ensembles of the static and dynamic models, reflecting the range of possibilities associated with each subsurface feature.

**An evergreen solution: Keep your model up to date with the latest field information, saving time and money**

As a repeatable workflow, Big Loop enables models to be updated quickly and easily as new data arrives, ensuring that future decisions are based on the very latest information. Geoscientists can create an ensemble of possible models, to support multiple hypotheses and scenarios. Cross-domain workflows are fully automated and repeatable, so that they can be reused with new data, including horizontal wells. High degrees of automation allow any subsurface specialist to run the workflow and test for sensitivities, with little prior application knowledge.

**A collaborative solution: All domains contribute to defining the model, for increased efficiency**

A common workflow integrating all disciplines, from seismic to simulation, provides a unique collaborative environment that leverages the contribution of every member of the asset team. A unified understanding of the reservoir results in greater quantification of risk and well-informed decisions about future development scenarios.

**Tight integration of the static and dynamic domains**

Big Loop tightly integrates dynamic and static parameters throughout the full E&P lifecycle, from seismic interpretation to geomodeling, reservoir engineering, and production forecasting, with uncertainty distributions correlated across domains.

![Ensembles](image)

> Ensembles provides a reliable measure of the risk for green (in green to brown (in pink) fields. They can be used to confidently predict reservoir performance.
Sensitivities can be tested, and their effects on the static and dynamic model determined. Static and dynamic modeling occur near-simultaneously. History matched dynamic models are geologically consistent. Knowledge from one domain is preserved and communicated in the next, with data integrity preserved throughout the workflow. There is no such thing as a simple or complex model; models are fit for purpose. The result is dramatically reduced cycle times.

The Big Loop ecosystem

The flexible, open Big Loop ecosystem allows in-house and third-party applications to be integrated via the Roxar™ App Connector. All steps can be automated through the Tempest™ ENABLE and Roxar RMS Workflow Manager. All runs are easily controlled and instantaneously screened thanks to flexible and intuitive data management and displays.

Customizable to your needs

Big Loop is available as software and services, according to customer needs.

- Consulting services and support
  - Big Loop studies as a Service
  - Support services: Define workflow strategy for your assets, customize to solve specific challenges
- As a product offering incorporating Tempest™ and RMS™, as well as SKUA-GOCAD™ – all mature and proven solutions

Big Loop Features

- Automated scalable workflows, from G&G to Reservoir Engineering
- An ensemble-based workflow that tightly integrates the static and dynamic domains, supporting collaborative workflows and reliable risk assessment
- The ability to quickly and efficiently build models and update them as new data arrives – “evergreen” models
- Capture, preserve and propagate uncertainties across all domains for better predictions and decision support
- Generate revised history matched ensembles with minimal clicks
- Sample through uncertainty spaces and automatically create hundreds of models. Uncertainties can be automatically combined and generate hundreds of runs.
- Machine learning-optimized assisted history match – models reservoir response to parameters in order to minimize the number of models needed to achieve history match

The Advantages of Big Loop

- Fully automated cross-domain workflows facilitate easy model updates, enabling domain specialists to focus on analyzing results and not (re)making manual fixes.
- Aligning disciplines through a common platform increases efficiency, enables better collaboration across typically siloed disciplines, and supports optimal decision making.
- Improve prediction quantification using ensembles (machine-learning technology) calibrated by all available geology and production data.
- Comprehensive ensemble analytics tools help dramatically improve understanding of the reservoir and uncertainties, and assess overall reservoir risk throughout the life cycle of an oil or gas field.
- Embrace digital transformation for better collaboration and team efficiency. Change the way models are designed, from building one “perfect” but wrong model to creating multiple models that can be improved automatically as new data arrives.
- Flexible offering:
  - Green to brown fields
  - Laptops to clusters
  - On premises to the Cloud

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