How can we manage risk and subsurface uncertainty in upstream assets?

YOUR GOAL: Optimize exploration and production from mature fields

Each year, oil and gas companies lose 10 percent of their assets worldwide. Replenishing supply means buying other companies, increasing production or finding new fields. Given that it takes five to 10 years to bring a new field online, companies must balance near- and long-term asset development. Exploration of more geologically complex and remote areas – often with little supporting data analysis – is necessary to reach deeper hydrocarbon deposits. In addition, companies must optimize production equipment to extract assets at an expected pace.

To examine the exploration and exploitation projects in their current expenditure portfolios, companies must be able to quickly recast internal rates of return while resetting underlying hydrocarbon reference pricing and assumptions based on development costs. This requires risk re-evaluations, improved risk controls and new risk management scenarios, all of which demand improved modeling capabilities. Production curve optimization is also necessary to ensure that maximum recovery is achieved for every well and reservoir.

OUR APPROACH

Data integration, risk assessment and quantification of uncertainty are key issues in petroleum exploration and development. We approach the problem by providing software and services to help you:

- **Improve the quality of data you rely on for critical decisions** by:
  - Integrating relevant data – historical, right time and real time – from multiple monitoring and surveillance systems across all GGRE disciplines into a unified view.
  - Automating all critical preprocessing tasks – merging data files, addressing missing values, clustering, dropping variables and filtering for outliers.
- **Increase the reliability of reserves information** using advanced modeling to generate reservoir models that truly reflect the spatial relationships between geological elements and their petrophysical properties – whether anisotropic or isotropic in nature.
- **Predict unplanned events** so you can take steps to mitigate their impact by using predictive analytics based on workflow rules that you define.
- **More accurately determine reservoir properties** such as porosity and permeability, using spatial analytics that incorporate variograms, kriging and simulation.
- **Increase decision support across disparate upstream disciplines** by using data mining to create accurate predictive and descriptive models based on enterprise data collected from geology, geophysics, petrology and reservoir engineering.
- **Present probabilistic results in a dashboard environment** using flexible reporting capabilities that let you quantify uncertainty, provision fundamental and imperative flow simulation input, and mitigate potential risk.

SAS® enables more reliable drilling plans, improved secondary and tertiary recovery strategies, and a more comprehensive portfolio analysis of upstream assets.

*IT Impacts from the BP Oil Spill, EI224330, July 2010, IDC Energy Insights*
THE SAS® DIFFERENCE: Reliable data for improved decision making

Successfully overcoming the challenges associated with oil and gas reservoir optimization – particularly those exacerbated by few direct observations – depends on your ability to integrate GGRE data, quantitatively describe heterogeneity and comprehend the range of uncertainty. SAS provides you with those abilities through:

- **Powerful data integration.** SAS provides an unmatched ability to collect and transform multiple, siloed data sources into a unified body of knowledge.
- **Collaborative business intelligence.** SAS delivers crucial technology that enables key team members to view and understand important analysis about well placement, stimulation strategies and well performance.
- **Predictive and spatial analytics.** Award-winning, proven and reliable, SAS Analytics provide the foundation for improved decision making across GGRE silos.
- **Flexibility and scalability.** SAS can grow and change along with you, adding new functionality as needs arise, so your potential for continual improvement never ends.

SAS has nearly three decades of experience working with energy and utility companies to develop solutions designed to help them achieve organizational improvements that have a direct impact on the bottom line.

CASE STUDY: Petrobras

**Situation**

Petrobras relies on senior geologists to analyze rock formations, seeking the best opportunities for maximizing existing wells or drilling new ones. The results of the analyses inform multimillion-dollar investments in constructing oil wells at sea. Therefore, the geologists need to fully understand reservoir characteristics to ensure maximum production from the upstream assets in accordance with contemporary economic plans.

**Solution**

SAS provided a solution for constructing analytic models that enable the company to identify rock breaks that produce oil or gas, significantly increasing the output of oil and helping to recuperate hydrocarbon supplements. The solution includes:

- Scalable data manipulation – evaluating vast amounts of geologic and historic production data.
- Customized intelligence – segmenting patterns of production that are specific to marine or terrestrial flow.
- Integrated analytics – for forecasting and predicting future reservoir production.

**Results**

- Achieved a daily record output of barrels of oil, nearly doubling the previous record.
- Increased volume from terrestrial wells by enabling technicians to evaluate and prolong the life of mature fields.
- Improved project profitability by maximizing production levels from extant reservoirs with enhanced appreciation of new well locations for maximum exploitation.

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