

Best Practices in the Management of Uncertainty in the Upstream – Concepts and Examples

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Uncertainty is becoming an increasingly important topic within the upstream energy industry. This is driven by complex opportunities, incentives to monetize assets rapidly, large up-front investments, and a fierce competitive climate. This has catalyzed improvements in the characterization and communication of uncertainty, along with its integration with decisions.

A learning-based system describes a generalized uncertainty work process. Initially, it is important to do a Situation Analysis, to evaluate the objectives, constraints, previous learnings, and critical factors. This sets the context and ensures a shared understanding of the problem. The next step is to Define Alternatives. This requires us to develop alternative hypotheses, identify risks, and evaluate dependencies. Alternatives are developed in a climate of collective inquiry, with external views sought and honored. Third, is the development of an Integrated Uncertainty Model. In addition to the familiar probability distributions generally employed, it is critical that discrete scenarios are developed to help describe, test, and communicate uncertainty. Additionally, an uncertainty management plan is developed. The last aspect is to Execute and Steward – monitor results, share learnings, and administer the plan. The cycle is repeated as important learnings trigger a new uncertainty evaluation, starting with Situation Analysis.

From the case studies presented, human factors remain a challenge, with several pitfalls illustrated: • Key uncertainties overlooked (unknown unknowns) • Inability to see alternatives (myopia) • Systemic errors based on paradigms (bias) • Misalignment of expectations and results (surprises) • Reluctance to accept uncertainty (demand for definitive answers) • Business factors override technical characterization (momentum)