SPE 57473 Managing Risks Using Integrated Production Models: Applications

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An approach to help strategic decision making over the field life was developed by quantifying and managing uncertainty and understand the risks and potential value of future decisions and actions. This approach is called Risk-Based Integrated-Production Modelling (RIPM) and the objective is to manage fields proactively rather than on a reactive basis. The RIPM process should therefore be used to create a living model (in this case using MBAL, GAP and PROSPER) to manage the field during all phases of its life.

Having created an integrated GAP model, local and global performance predictions, base assumptions and input data can be validated as the subsystem designs are implemented and a strategy is set. The IPM model should be used throughout the operations phase to optimise daily production through to the maintenance of base decline and finding uplift opportunities. The table below highlights the breadth of applications to which RIPM is to be applied:

Time

NEW MATURE HARVEST

	Development	Evaluation and Expansion	Operation and Maintenance	Acquisition or Exit
Questions	**Develop?**	**Expand?**	**Operate?**	**Buy? or Sell?**
Issues				
RESERVOIR	Exploitation strategy: Number of reserves, Permeability, PVT	Pressure maintenance	Rates	Value
WELL	Completion strategy: Number of wells, Type, Tubing	Increase wells, Workover	Gas allocation, Shut-in wells	Technology opportunities
FACILITIES	Platform strategy: Subsea, TLP, FPSO	Debottleneck, Upgrade	Debottleneck, Compression	Leveraged facility opportunities
Model Usage	Develop and Scope	Validate/Update	Predictive/Diagnostics	Match data/ Scope opportunity
Decision Time	Months to year	Weeks to months	Days to weeks	Months
Data Needs	Little/Basic data	Feedback data	Diagnostic data	Wide range

Fig. 1—RIPM applications.

Conclusion:

RIPM adds value to the decision making process over the asset life cycle by integrating the subsystem models with the quantification of the effects of uncertainty. This is a dynamic and iterative process which is well suited to investigating the different decisions required during; development, expansion and operating stages of an asset. This approach provides a framework for defining a strategic direction and responding to new or unexpected data as it is collected.