

## **Project Title: Production Forecasting for Brownfield Development using Machine Learning**

### **1. Major Objective**

- Develop mathematical techniques with optimised correlation to create a behaviour model of mature fields based on legacy data such as production data, pressure, well test, geological data, fluid characteristics etc. for optimising future exploitation strategy
- Ranking of actions such as well interventions (changes in production, injection rates, conversion to injector, stimulation, zonal isolation etc.) based on past behaviour and evaluate impact of “such actions” by integrating reservoir and well physics with machine learning in forecasts.

### **2. Proposed Methodology**

- Developed algorithms based on statistical theories will estimate future production after validating a blind test by comparing parameters like estimated oil production data with historical data prior to forecasting. The matching process will define the best set of parameters which minimizes the risk for forecast.
- Proposed project will combine domains of reservoir engineering, data science and computing power to develop analytical predictive models.

### **3. Scope of work**

- To develop a behavioural model of the mature field involving data mining and utilising analytical workflows for various field development scenarios at well and field level.
- Develop a software toolkit (forecast simulator) in a way that it complies with the condition of a reliable long term forecast with detailed visualisation.

### **4. Deliverables**

- Develop a production forecast simulator based on reservoir engineering, physics and machine learning which best represents the past production data at well and field level for robust forecasting capability
- Demonstration of developed simulator for History Matching process and define parameters which will minimise risk in production forecast
- Based on given set of production parameters (for e.g. varying well production rate) and/or field interventions (well stimulation, conversion to injector etc), generate forecast scenarios
- Real Case demonstration of selected ONGC field (minimum 2 fields) for optimization of production strategy using developed forecast simulator

### **5. Relevance to ONGC**

- The toolkit will represent proper compromise between classical and simulation models to predict optimal development scenarios in relatively short time (as compared to conventional workflow: Preparing static model, reservoir simulation and forecast scenarios).
- Project has the potential to organise and convert large legacy data into real assets for forecast modelling utilising machine learning techniques for improving recovery
- Optimal well placement can be identified by data mining techniques. Moreover, it would be helpful in well production optimization and reservoir management
- Methodology is computationally fast and with field heterogeneity reflected in production history/well interventions, it complements numerical reservoir simulation forecasts

### **6. Time Frame: 3 years**

### **7. Budget: Indicative budget ~45 Lakhs**

### **8. Proposed IIT: IIT Mumbai/ IIT (ISM), Dhanbad**