Creating an ecosystem for VLP optimization and flow assurance for Mumbai high offshore asset.

Through hybrid models viz. Legacy models, AI/ML and collaboration tools

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Drivers

DOF implementation drives the **overall asset operations** from a **reactive to a prescriptive regimen**.

**Digital Oil Field** serves two main objectives:

- Maximize Reliability and Availability of the Facility Assets
- Improvement of Reservoir Recovery over Life of the Field (LOF)
Background

Reservoir Management System (RMS)

Production Management System (PMS)

Maintenance and Asset Management System (MAMS)

Advanced Collaboration Environment, MIS and reporting

Production (Well and network)

Processing
Find the best solution to join the dots

Reliability requires lots of optimization

Steady State or Transient

Advisory OR Closed Loop

Defining Boundaries

On Prem OR Cloud (Public/private)
The Loops

Historical Data → Simulators → Iops AI/ML/rule based Model (X) → Physics based Model → Advisory

Via SCADA

Real Time data (Y) → X=Y → Yes/No

Anomaly Alarm
Both the cases belong to biggest and oldest offshore field of India- Mumbai High

Known for is reservoir heterogeneity with majority of wells on continuous gas lift and water injection as EOR.

- **Water injectors** – started with installation of in-line flow instrument. (CAPEX intensive approach)
  - Improving the accuracy of existing models

- **Oil & gas producers** – started with having an *advisory system* with the available instruments. (OPEX intensive approach) - IDAS (Integrated Digital Analytics System) project
  - Creating an ecosystem for VLP optimization and flow assurance for mumbai high offshore asset. Through hybrid models viz. Legacy models, AI/ML and collaboration tools
Where we are

Real time Surveillance

MS Office Based Input:
Well intervention History, well bore sketch, Major events

SAP: Based Input

Data Base

Analytical Tool
## Impact on Expenditure

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## Impact on DELAY in incremental first oil

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# Impact On Accuracy Of Developed System

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Quantifiable Value & Benefits

Analyst’s work hours –

Analyst’s work-hour taken for well model tuning manually and well-testing done per day in MH platforms:

Assuming 22 days working days in a month

work-hour required for tuning and validation of well models

= 4 hours per well

= 2 well per employee a day

= 44 wells an employee a month.

Wells tested per day= 36 wells per day

= 1080 wells per month

So, analyst needed for well model tuning and validation= 1080/44= 25

If CTC of each average employee a year is approx. 50,000 USD.

The CTC for the same is approximately 1250000 USD per year.
Benefits Over Investment for various OIP

Assumptions–

- Increment in recovery factor = 0.5%
- API of crude = 35
- Crude Realisation for next 25 years = 80 $/bbl
- DOF cost per well = 10000 $
- Minimal presence of instrumentation and control system at well
- Benefit = OIP * increment in recovery factor * crude realisation
- Investment = DOF cost per well * no. of wells,
- No accounted: HSE, Logistics, Workforce, decrease in carbon emission

Even in worst case scenario the B/I ratio is 1.5
Conclusion: **There is no Ideal strategy**

A mix of CAPEX and OPEX mode needs to be implemented.

For greenfield and Brown field (with >10 years of production left): CAPEX Model

For marginal & smaller end of life field and bigger field with <10 years of production left: OPEX Model

Facility, production-profile and company specific.

Ready “Blueprint” of implementation for the company driven by the CEO where the CIO is the chief execution person for the blueprint.

A: CHANGE MANAGEMENT

B: DATA INTEGRITY
Q & A