# 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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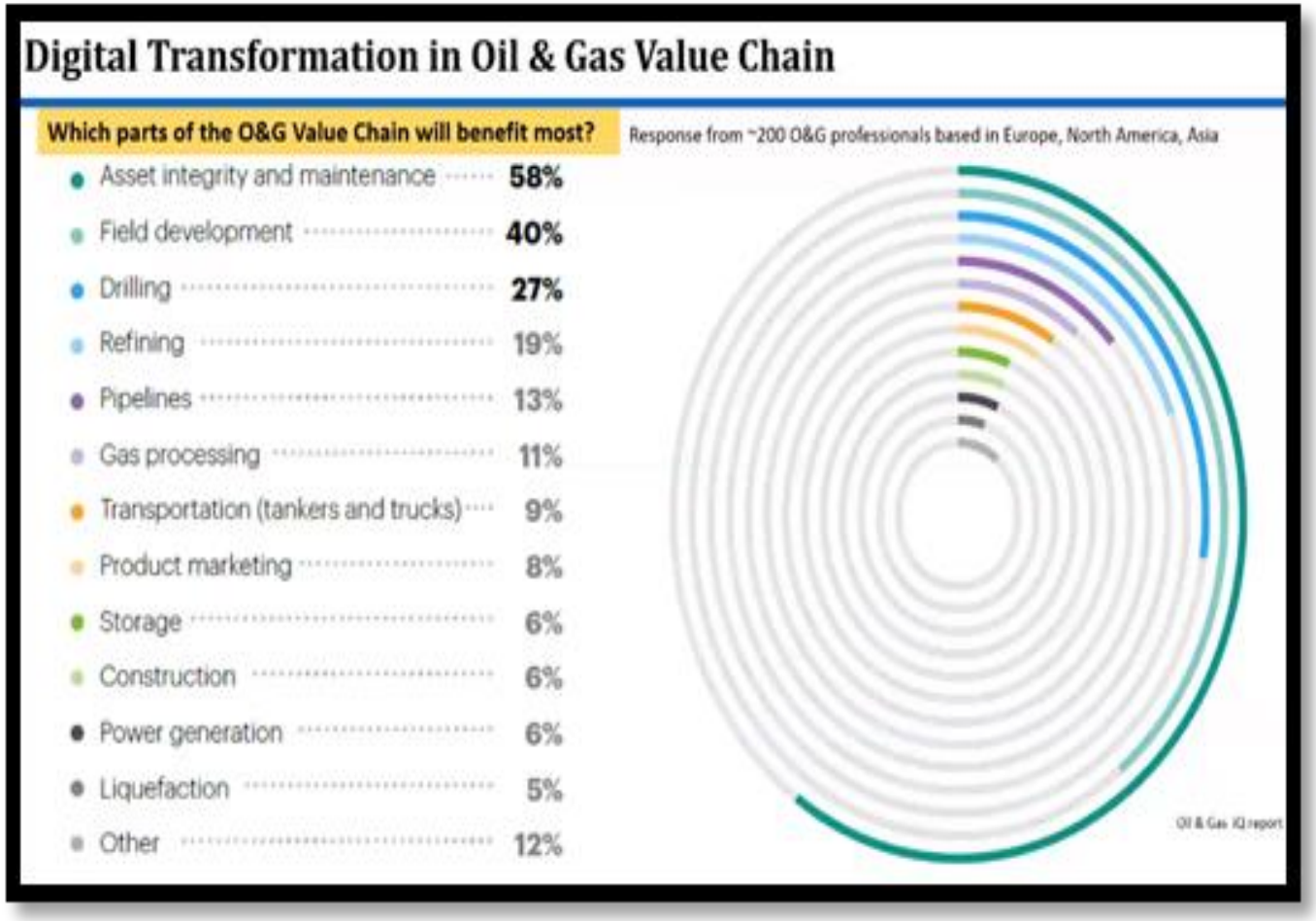
# Drivers

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)



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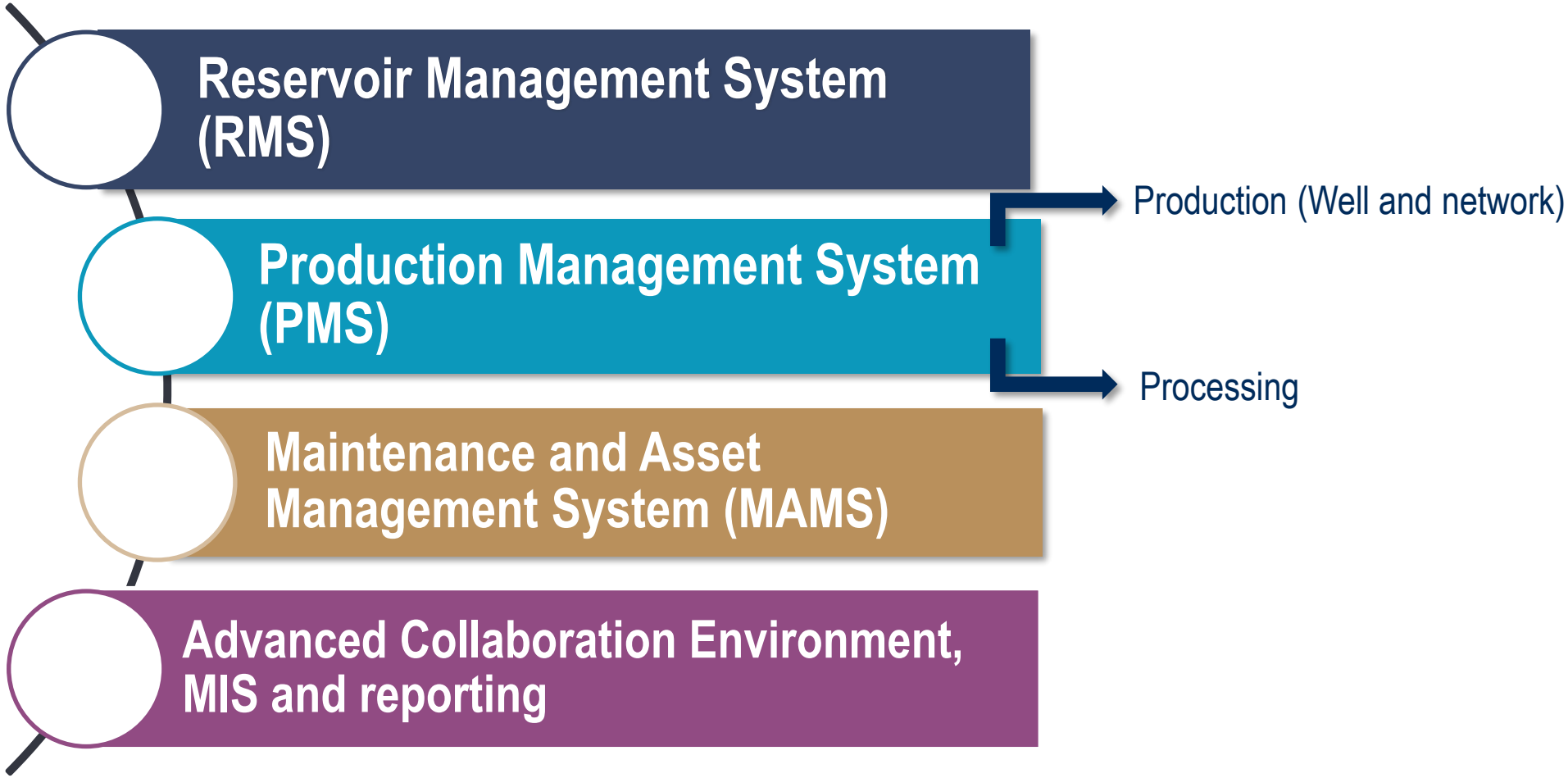
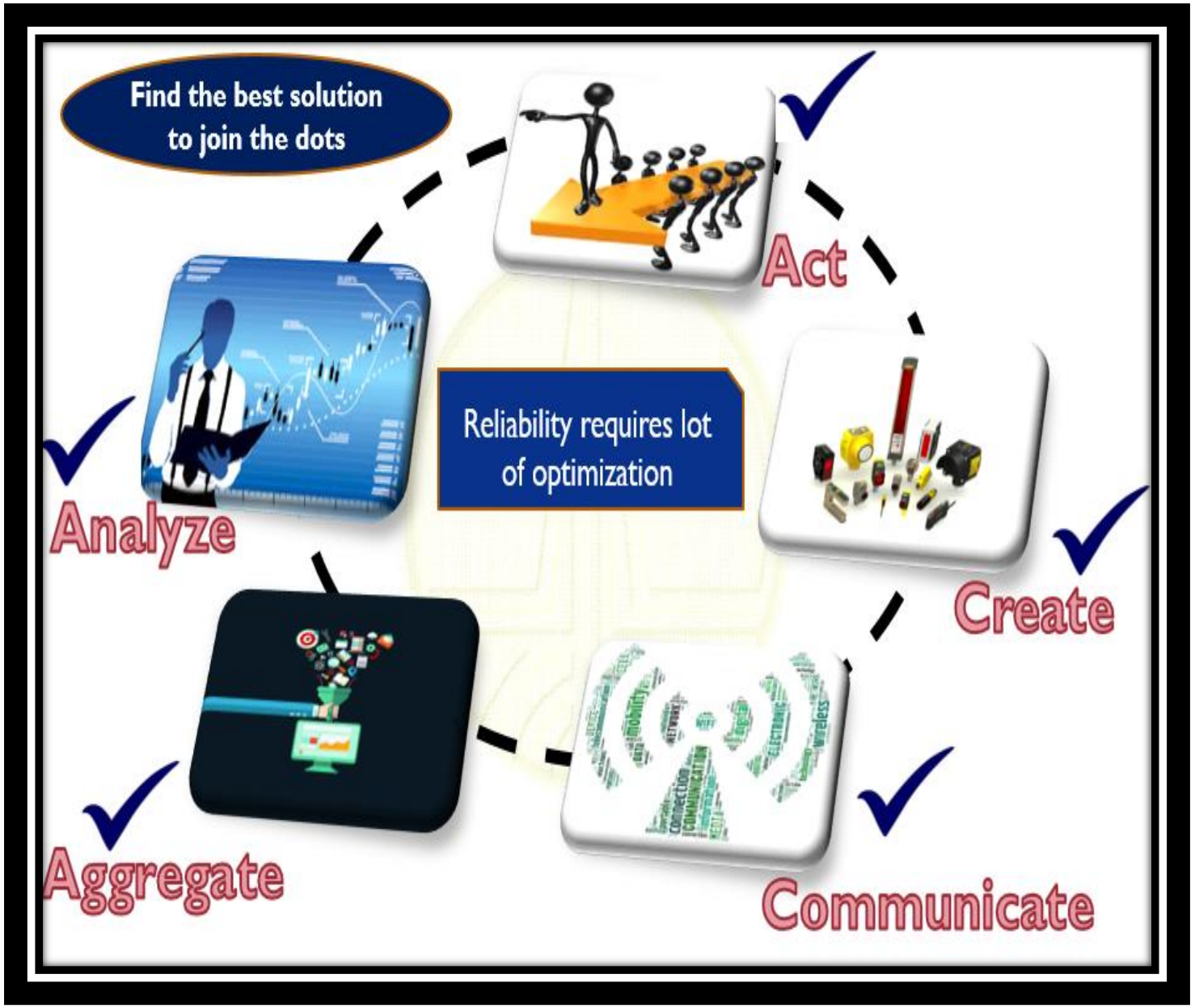
# Background





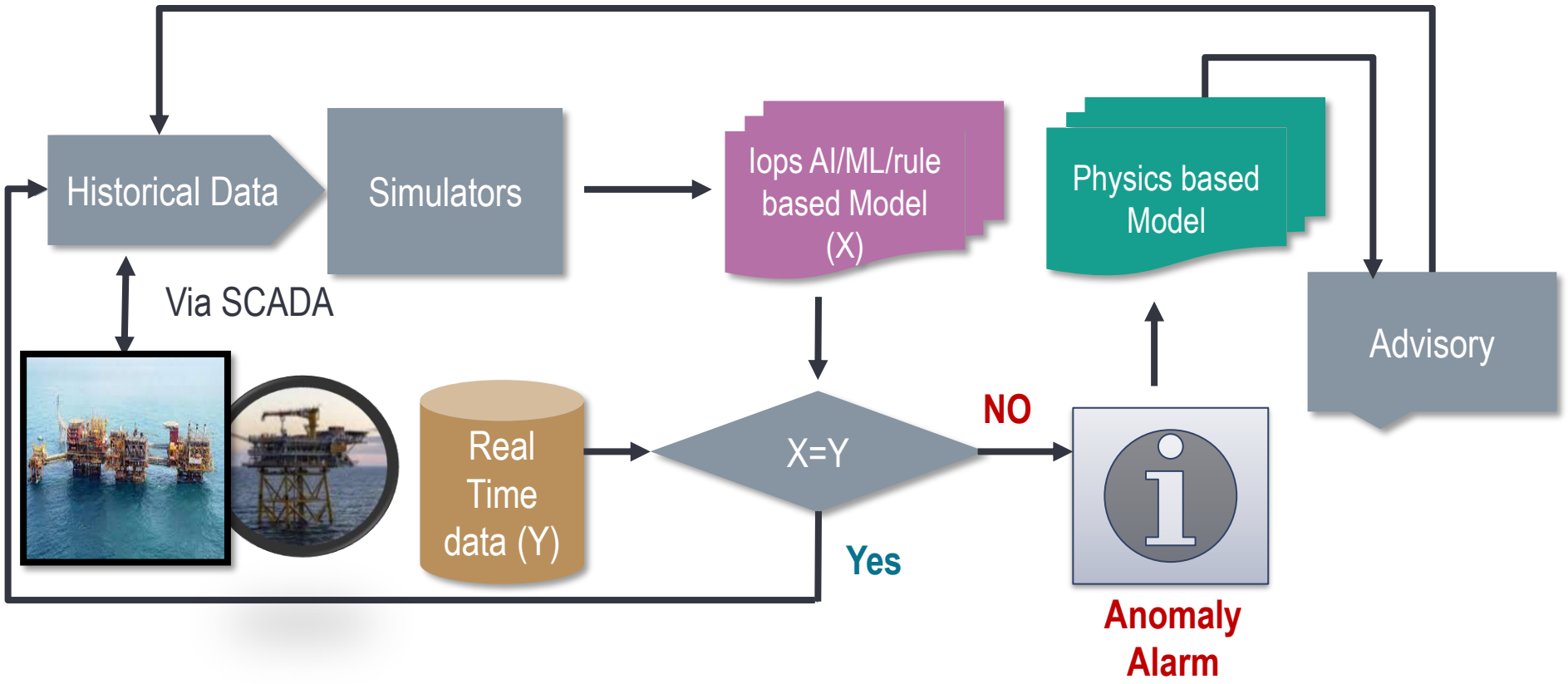

Steady State or Transient

Advisory OR Closed Loop

Defining Boundaries

On Prem OR Cloud (Public/private)

# The Loops



# Case Brief

## Both the cases belongs 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*



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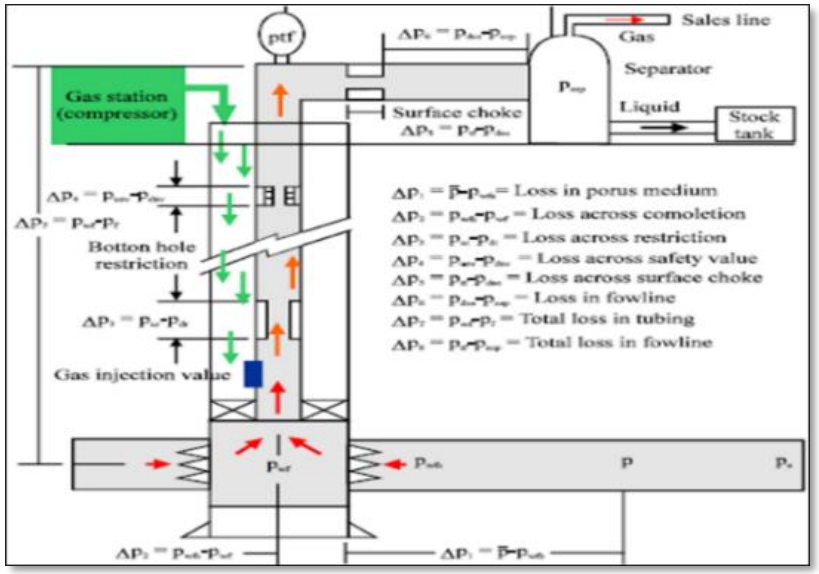
# Where we are

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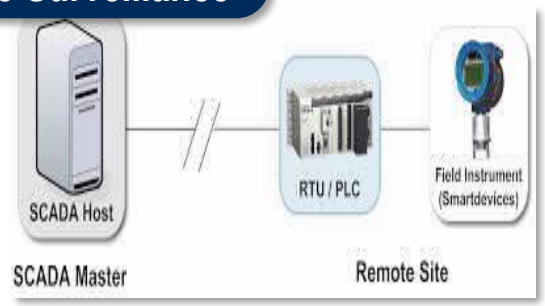
**Real time Surveillance**

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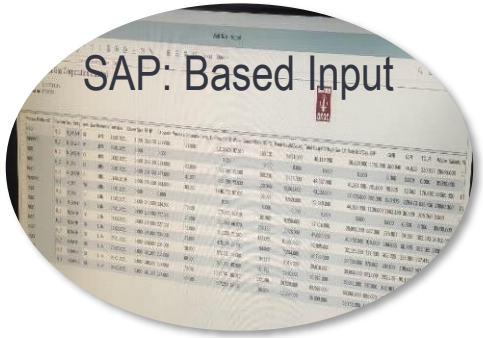
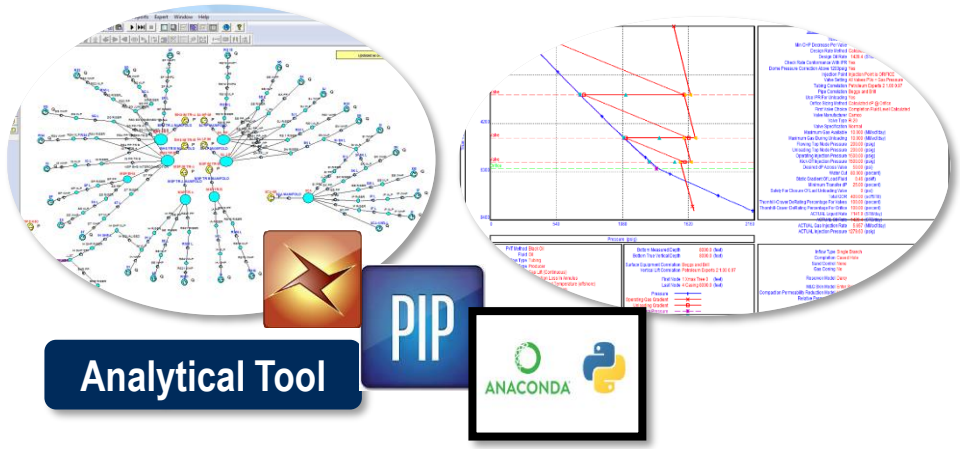
MS Office Based Input:
Well intervention History, well bore sketch, Major events




**Analytical Tool**

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**Data Base**



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# Impact on Expenditure

| DOF Blocks | Low | Medium | High |
|---|---|---|---|
| Creation of real time data in well (Includes Power revamp) | | | CAPEX<br>Case 1 & Case 2 |
| Creation of real time data at surface (Includes Power revamp) | CAPEX<br>Case 1 | CAPEX<br>Case 2 | |
| Communication infrastructure | | CAPEX + OPEX<br>Case 1 & Case 2 | |
| Aggregation of data | OPEX<br>Case1 & Case2 | | |
| Analysis when modelling tools are available | OPEX<br>Case1 & Case2 | | |
| Analysis when modelling tools are not available | CAPEX+ OPEX<br>Case 1 | CAPEX+ OPEX<br>Case 2 | |
| Automation of Action through remotely controlled instruments (Includes Power revamp) | | CAPEX<br>Case2 | CAPEX<br>Case1 |
| Accessibility | CAPEX+ OPEX<br>Case 1 & Case2 | | |



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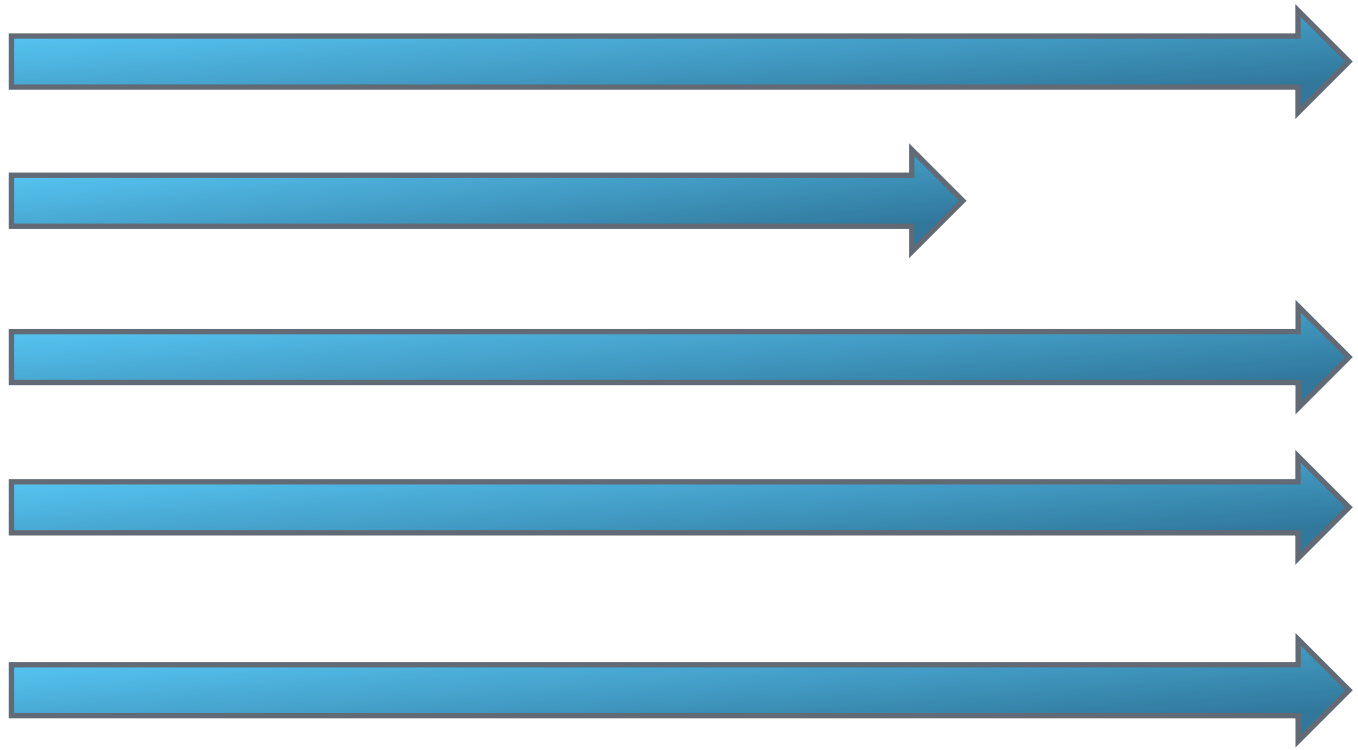
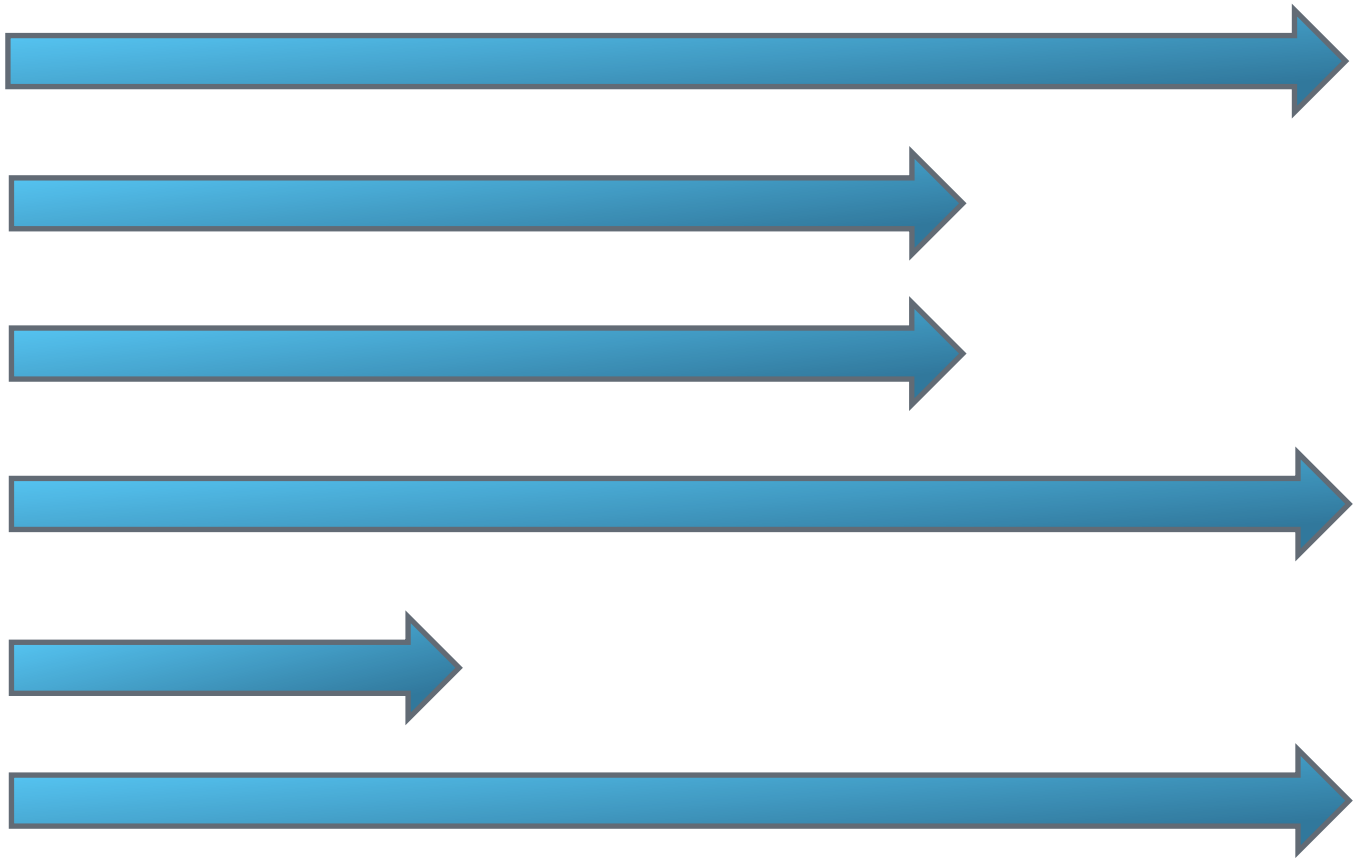
# Impact on DELAY in incremental first oil

| DOF Blocks | Low | Medium | High |
|---|---|---|---|
| Creation of real time data in well | | | |
| Creation of real time data at surface | | | |
| Communication infrastructure | | | |
| Analysis when modelling tools are available | | | |
| Automation of Action through remotely controlled instruments | | | |



# Impact On Accuracy Of Developed System

| DOF Blocks | Low | Medium | High |
|---|---|---|---|
| Creation of real time data in well | | | |
| Creation of real time data at surface | | | |
| Communication infrastructure | | | |
| Analysis when modelling tools are available | | | |
| Analysis when modelling tools are not available | | | |
| Automation of Action through remotely controlled instruments | | | |



# 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.**



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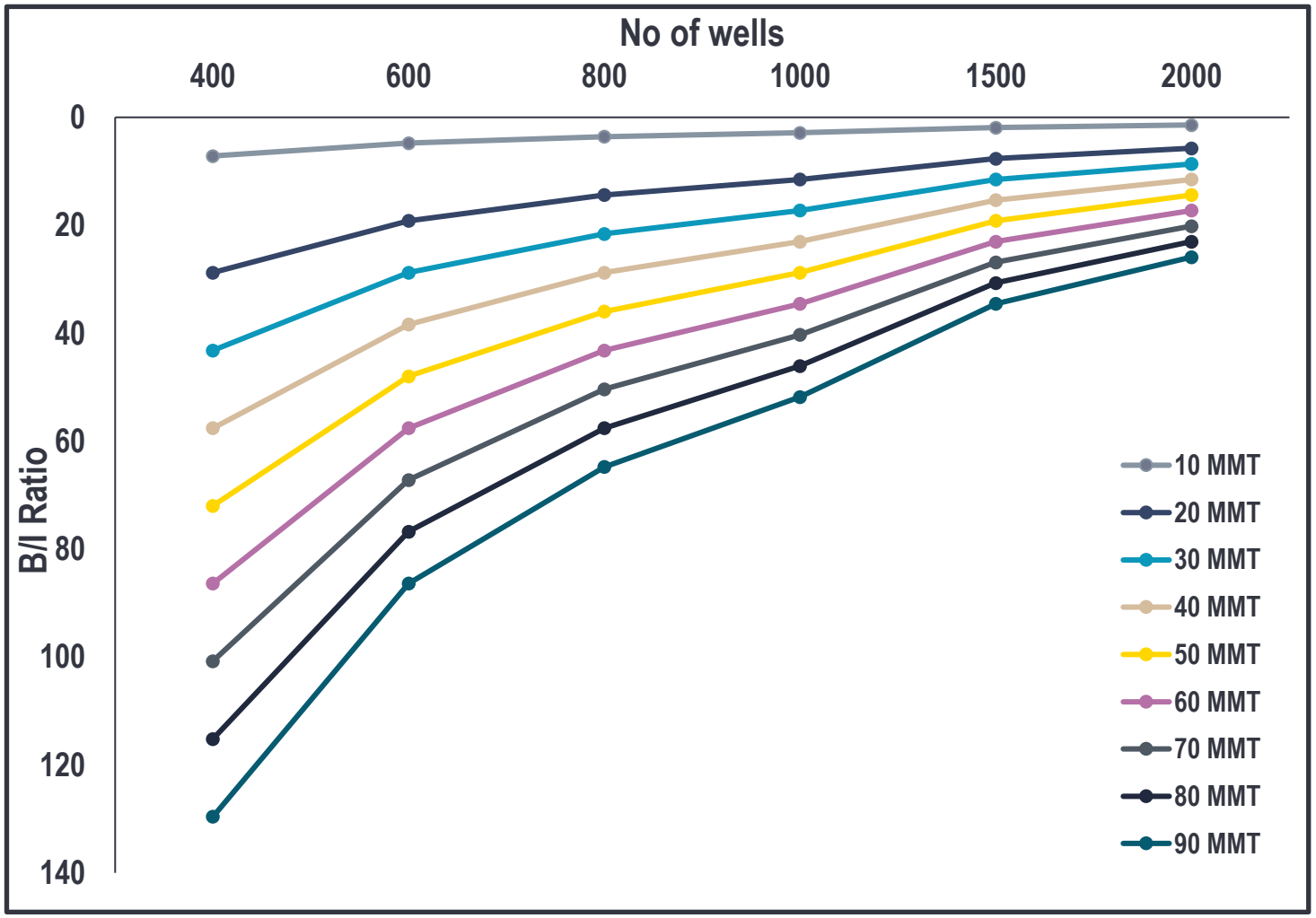
# Benefits Over Investment for various OIP




## 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**



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# Conclusion: There is no Ideal strategy


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

**A:** CHANGE MANAGEMENT

**B:** DATA INTEGRITY



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# Q & A


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ONGC