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Subsea to Floating: A Unified Field Development Approach

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Lifecycle Optimization of Aging Pipelines in Brownfield Developments

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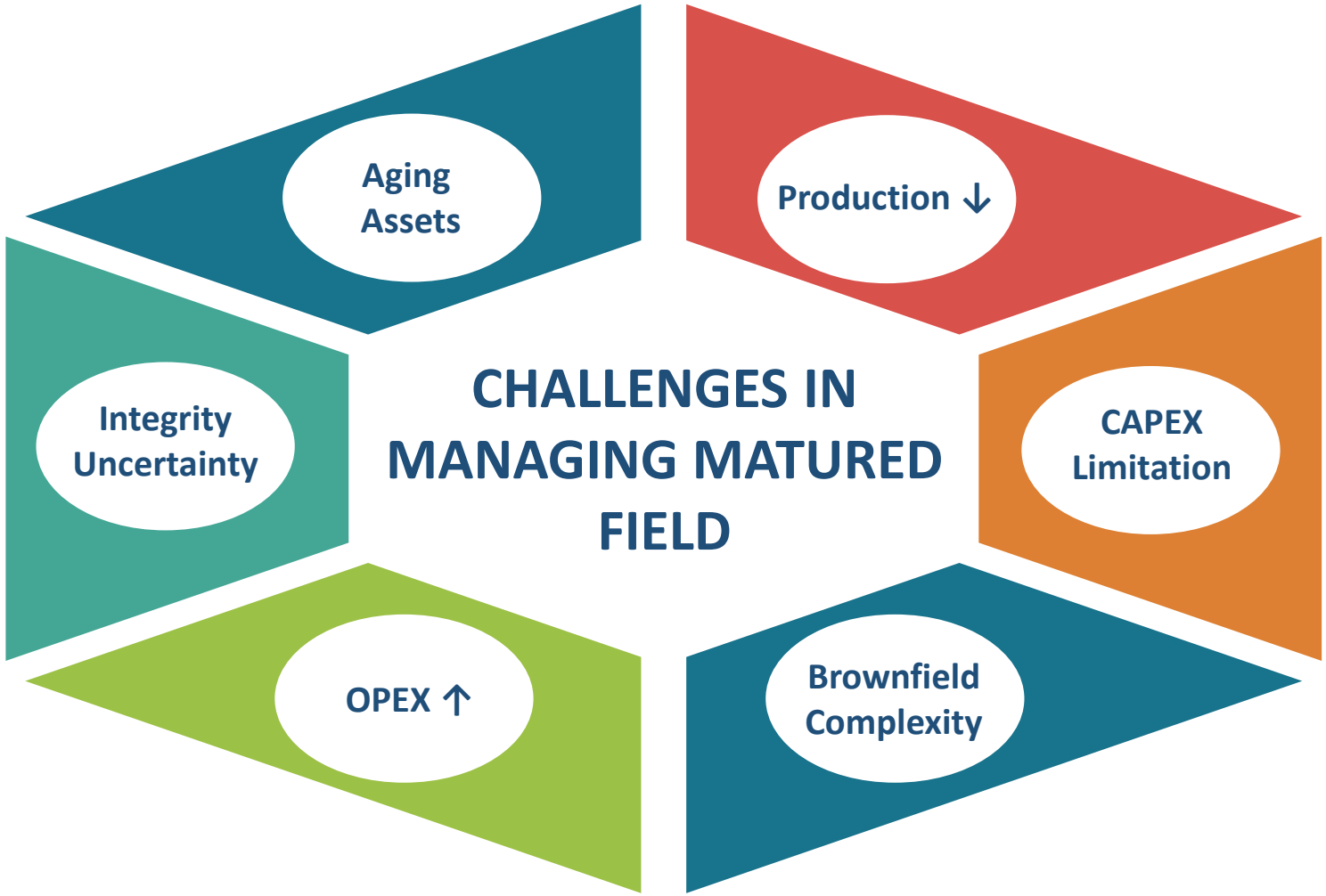
Today's Industry Reality



>30% of brownfield pipelines operating exceeds design life

CAPEX misallocation → replace too early

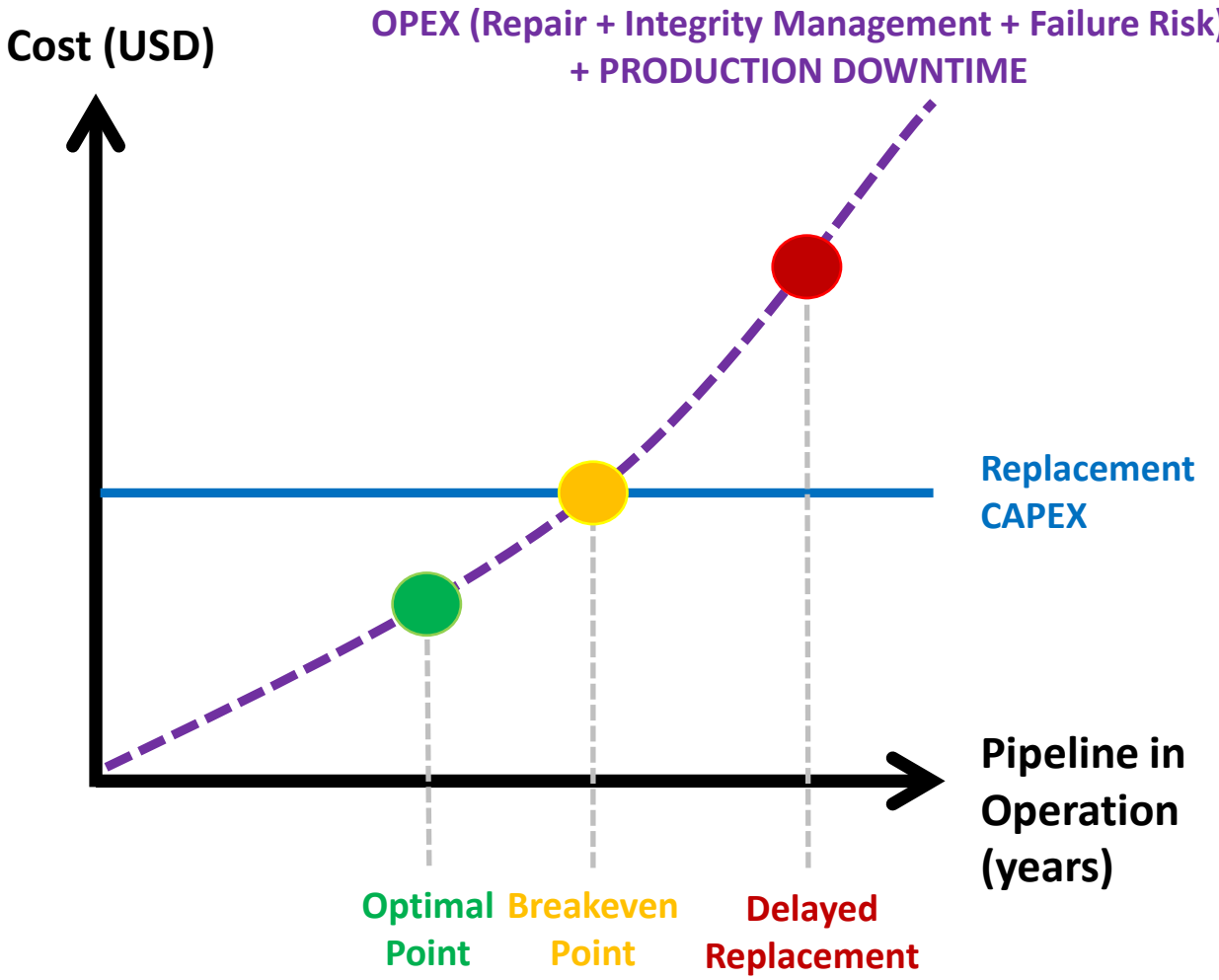
Integrity surprises (corrosion, flow assurance)

Binary decision: Replace Vs Run-to-failure

Area of Concerns: Conventional vs Optimization Way

AREA OF CONCERNS	CONVENTIONAL WAY	OPTIMIZATION WAY
Aging pipeline	Replace	Extend asset life strategically *(Rehabilitation/ Repair/ Re-assessment)*
Brownfield tie-in	High CAPEX re-design	Integrated operability assessment
Flow Assurance/ Corrosion	Increase chemicals	Re-visit operating envelope
Adoption to digital technologies ***(e.g. real-time data analytics, AUV, predictive maintenance, Subsea Inspection Management System)***	As of current practises	Small scale Pilot Project

The ‘Right Time’ Pipeline Repair vs Replacement?



OPEX Increases Over Time:

- Increases over time

Replacement CAPEX:

- Large sum big cost of new pipeline (with cost escalation)

Breakeven Point:

- Occurs when OPEX = replacement CAPEX

Optimal Replacement Timing:

- ‘Right time’ to replace before costs escalate significantly

Delayed Replacement:

- Too late! High probability for failure and production downtime.

Structured Decision Approach

THE REALITY 1

Siloed analysis

Reactive integrity management

Conservative decision *(e.g. early replacement)*

Aggressive decision *(e.g. run-to-failure)*

THE GAPS 2

Over-conservatism → **unnecessary CAPEX**

Under-estimate → **failures, production deferment**

THE APPROACH 3

Pipeline Integrated Framework (PIF)

OUTCOME 4

e.g.

- 5 years **life extension**
- 20% **OPEX reduction**
- **Cost avoidance** pre-mature replacement (RM Mil)

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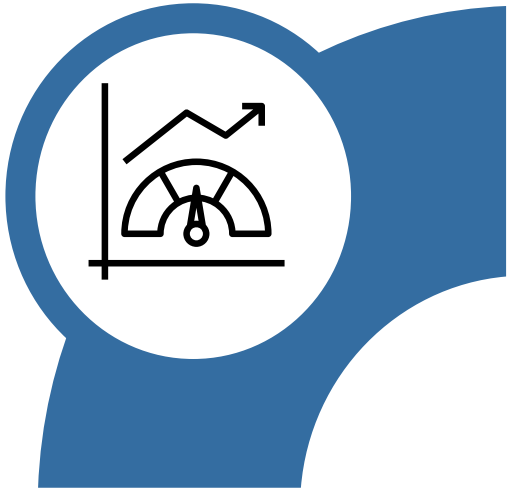
Pipeline Integrated Framework (PIF)

01

Integrated Integrity Modelling

- Corrosion assessment, 3rd party impact, etc.



03

Lifecycle Optimization:

- ***Extend***
  - Envelope ↓, monitoring +
- ***Re-purpose***
  - Convert crude → CO_2
- ***Retire***
  - De-commissioning

02

Risk-based Prioritization

- Production losses, financial impact, regulatory, PEAR

How many pipelines currently undergo life extension decisions right now?

Thank You