# Real-time risk management and optimised maintenance

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# Outline

- Point of view: Oceaneering global asset integrity experience

- Real-time risk management

- Optimised maintenance

- Information management
  - CBM

- Improving information management

- 'Solutions'

# Point of view

## Oceaneering Asset Integrity

- Global provider of Engineering, Operations and Maintenance Services for the oil and gas industry

- Large service portfolio and diverse experience within Asset, Maintenance, Operations and Supply Management

- Extensive experience in designing and utilizing computer based tools for various Asset Integrity purposes

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# Real-time Risk Management

## What should this mean?

- Real-time means **with lag**, just not very much of it

- Risk comes in several flavours
  - Safety and evironment, Cost, Production
- Management means decision making

# Real-time Risk Management

What should this mean?

Taking informed decisions with respect to risks based on a fairly complete and fairly current picture of the state of the asset

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# Maintenance Optimisation

## Optimised with respect to what?

- Several conflicting goals
    - Cost, Safety & Environment, Production
- Day to day operation costs versus Life-time costs

- Costs, availability, condition or something else?

- Strategic decision: Relative value of goals

    - What is availability worth?
    - What is condition worth?
    - What is remaining asset life worth?

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# Maintenance Optimisation

Optimised with respect to what?

The fundamental challenge is that to **optimise** we have to be able to **compare:** we need updated knowledge, and we need yardsticks

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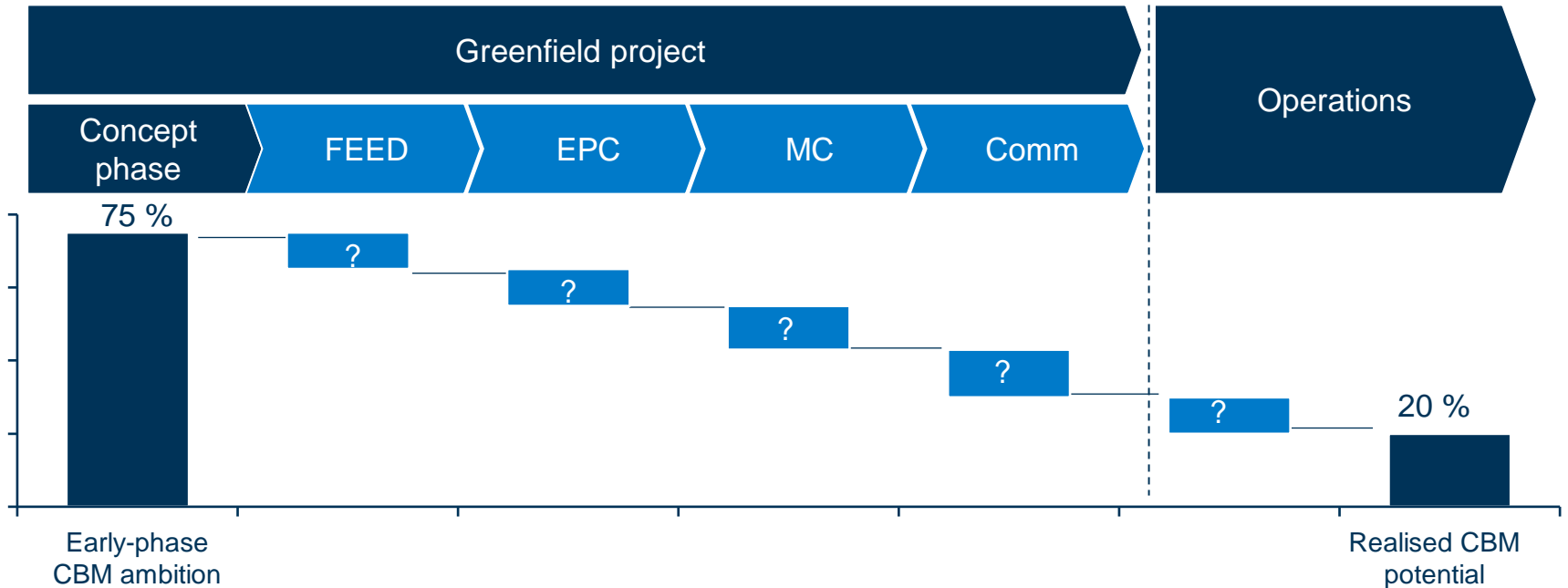# Real-Time Risk Management and Maintenance Optimisation

- This is the name of a Research Project submitted to NFR by UPTIME Centre of Competence

- How does this tie-in to 'Improving offshore engineering data and information management'?
    - Both of these components are essential to delivering Real-Time Risk Management and Maintenance Optimisation
- However, it is Oceaneerings experience that 'information management' is the bigger hurdle in this context

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# Current State with respect to Information Management

- The oil & gas industry currently harvests vast amounts of data

- In Oceaneerings experience very little is leveraged in operation

- Case in point: Condition Based Maintenance
  - Condition Based Maintenance is maintenanced executed on the basis of knowledge about the current and projected status for equipment
    - Has to be based off developed information
  - This has been an industry goal for ages
  - It is assumed to improve reliability, reduce risk and reduce cost

# Condition based maintenance strategy and reality

## Typical relation between ambition and results

# Improving information management

Moving towards Real-time Risk Management and Maintenance Optimisation

- An asset will have a very large number of data channels

  - From 14kHz vibration sensors to manual CUI-inspection every 5th year

- Decision making by humans on raw data in real time is not possible

- But even now, this is not how it is done

  - Large parts of the risk management is made abstractly in maintenance planning, based on corporate strategy and formalised methods
  - All equipment aboard an asset is structured in several ways

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# Improving information management

## Moving towards Real-time Risk Management and Maintenance Optimisation

- Corporate maintenance strategies for different equipment categories are based on statistical models, built from experience and frequentist data

- To reformulate corporate maintenance strategies to dynamic models used to predict performance does not change risk

  - Takes into account all previous decision making, and now provides rules for how developed data should be applied in operations
  - Additional sensor types demand additional dynamic models
  - It is however a large job, but done once per equipment category

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# Improving information management

## Moving towards Real-time Risk Management and Maintenance Optimisation

- Building a dynamic model of an asset provides much of the statististical data needed for Maintenance Optimisation

- It should also serve as a filter for information making Real-time Risk Management more feasible

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# 'Solution'

- It is Oceaneerings (limited) experience and belief that Real-time Risk Management and Maintenance Optimisation is an **evolution** from current methods for Risk Management and Maintenance Planning

  - In other words, there is no wheel that is missing here, only small parts

- On the other hand, there are very many such small parts

  - we belive that a full blown system for this needs to be projectized along with the asset itself

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# Thank You for Your Attention!

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