# Measuring and improving the quality of SRA/CRA

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equinor

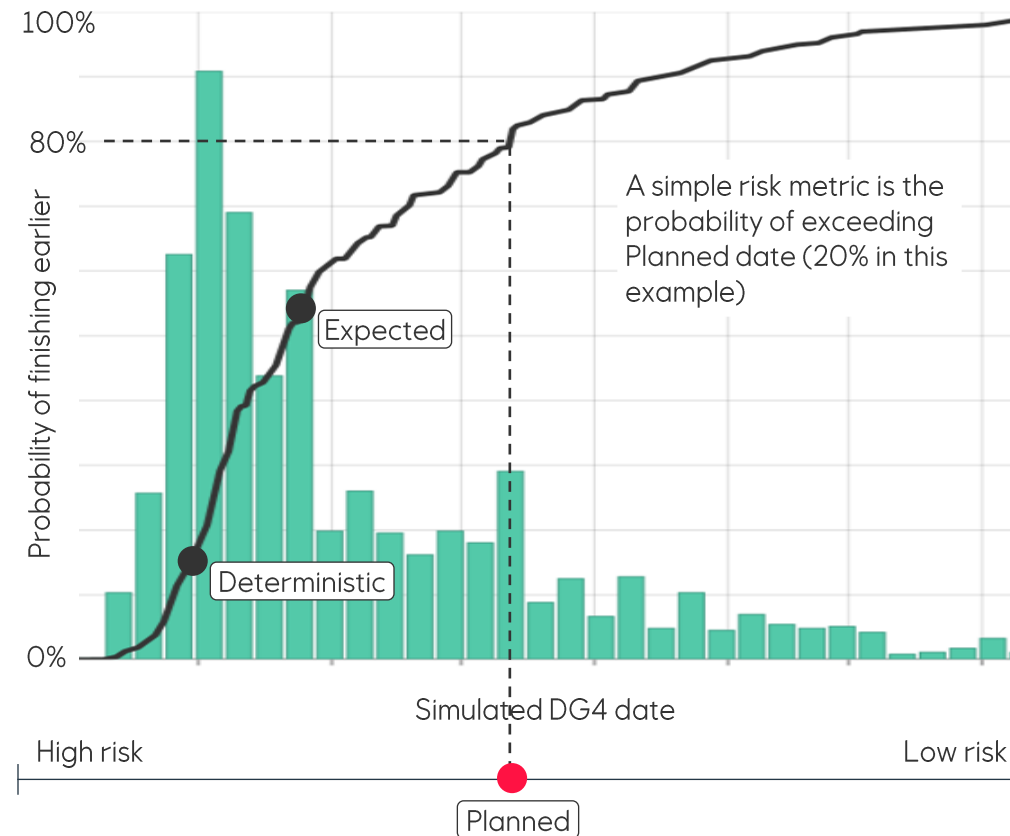# Content

# Project portfolio and SRA/CRA requirements

- Current project portfolio includes oil and gas, renewables (offshore wind), and low carbon solutions (CCS, hydrogen).

- Typical project size from 5 to 25 billion NOK with a 3 to 6 years execution phase

- Prior to DG1 simplified cost and schedule risk analysis or reviews are done.

- SRA and CRA is mandatory at DG2 and DG3. During execution, SRA and CRA is done when needed.

- Around 30 SRAs completed each year, with a similar number for CRAs.

- Safran Risk is used as tool for all SRAs and for an increasing number of CRAs



**DG0** | **DG1** | **DG2** | **DG3** | **DG4**

Business Development → Business Planning → Concept Planning → Definition → Execution

# Common terminology simplifies communication
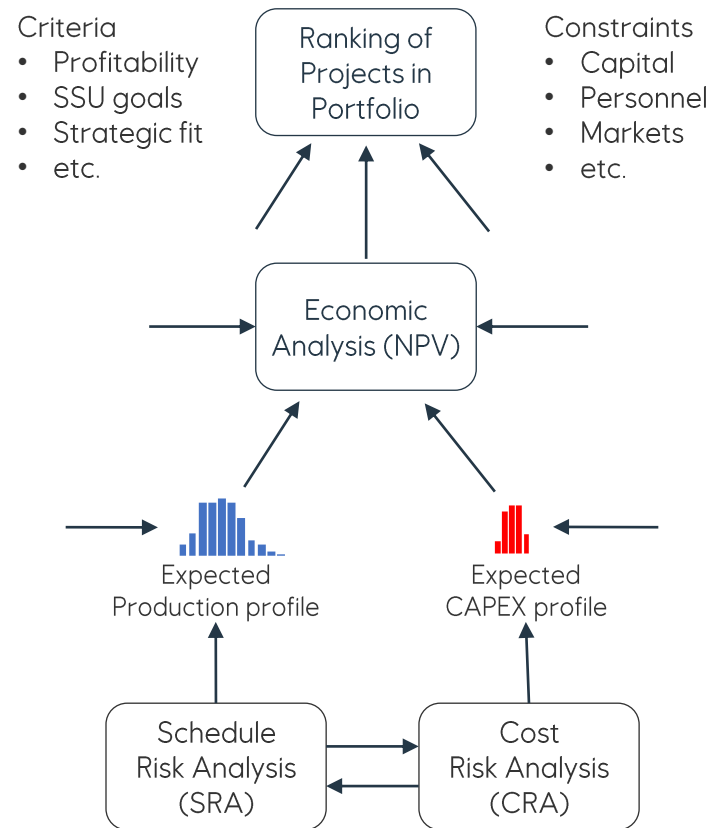
- Uncertainty:
  the lack of complete certainty – that is, the existence of more than one possibility. The 'true' outcome, state, result, value is not known. (Hubbard, 2020)

- Risk:
  the effect of uncertainty on objectives (ISO 31000, 2018)

- Risk acceptance:
  the level of risk that an organisation is willing to accept as basis for decisions

- Equinor is planning based on expected values for schedule and cost (risk neutral)

SRA example:
Simulated uncertainty and risk related to a project's DG4 date (production start)

A simple risk metric is the probability of exceeding Planned date (20% in this example)

Probability of finishing earlier

100%

80%

0%

Expected

Deterministic

Simulated DG4 date

High risk                                                    Low risk
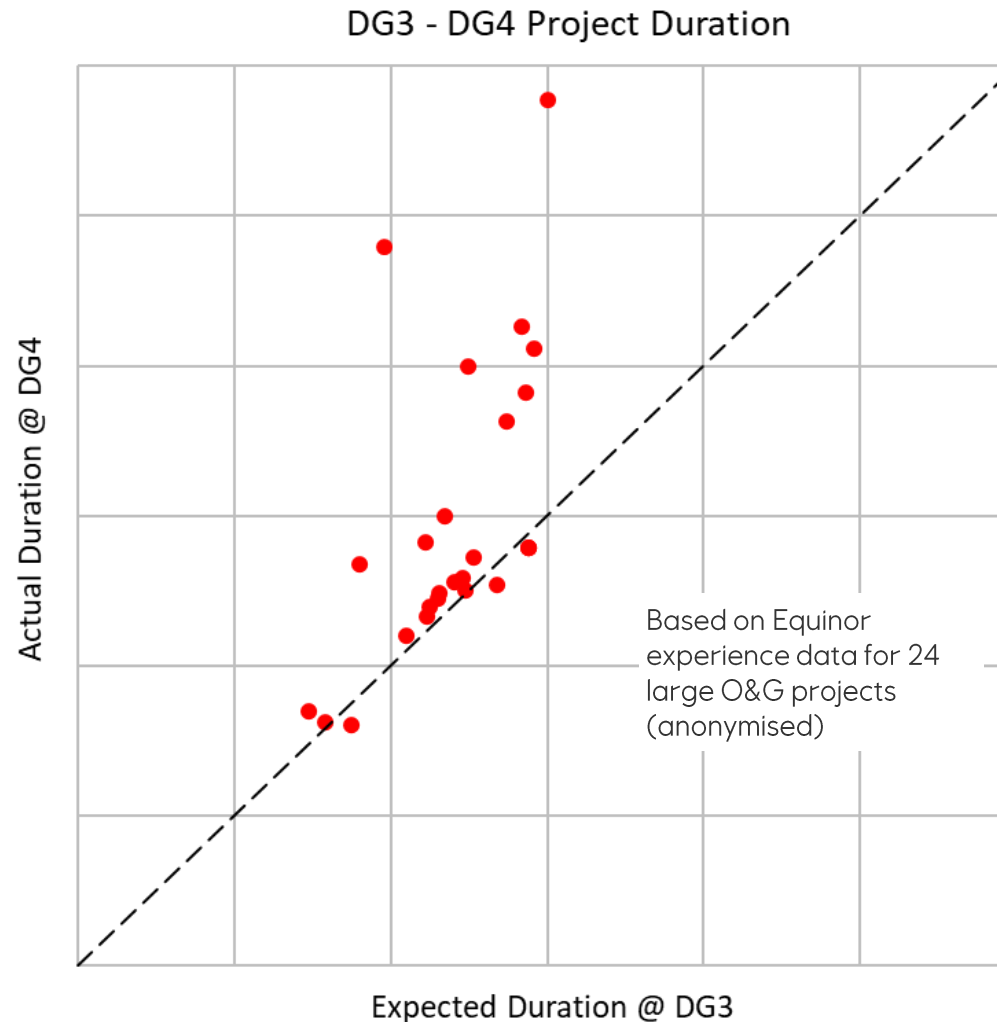
Planned

# What is SRA/CRA quality and why it matters

- The purpose of any risk analysis is decision support – does risk change ranking of decision alternatives?

- The decision to invest in a project depends on its predicted performance relative to competing projects

- NPV analysis is based on expected cash flows, with input on production start and CAPEX from SRA/CRA

- Quality is then related to how well the SRA/CRA simulations represent the actual uncertainty in the project

- This can only be measured *ex-post* comparing estimated and actual values for a relevant number of projects

Criteria
- Profitability
- SSU goals
- Strategic fit
- etc.

Ranking of Projects in Portfolio

Constraints
- Capital
- Personnel
- Markets
- etc.

Economic Analysis (NPV)

Expected Production profile

Expected CAPEX profile

Schedule Risk Analysis (SRA)
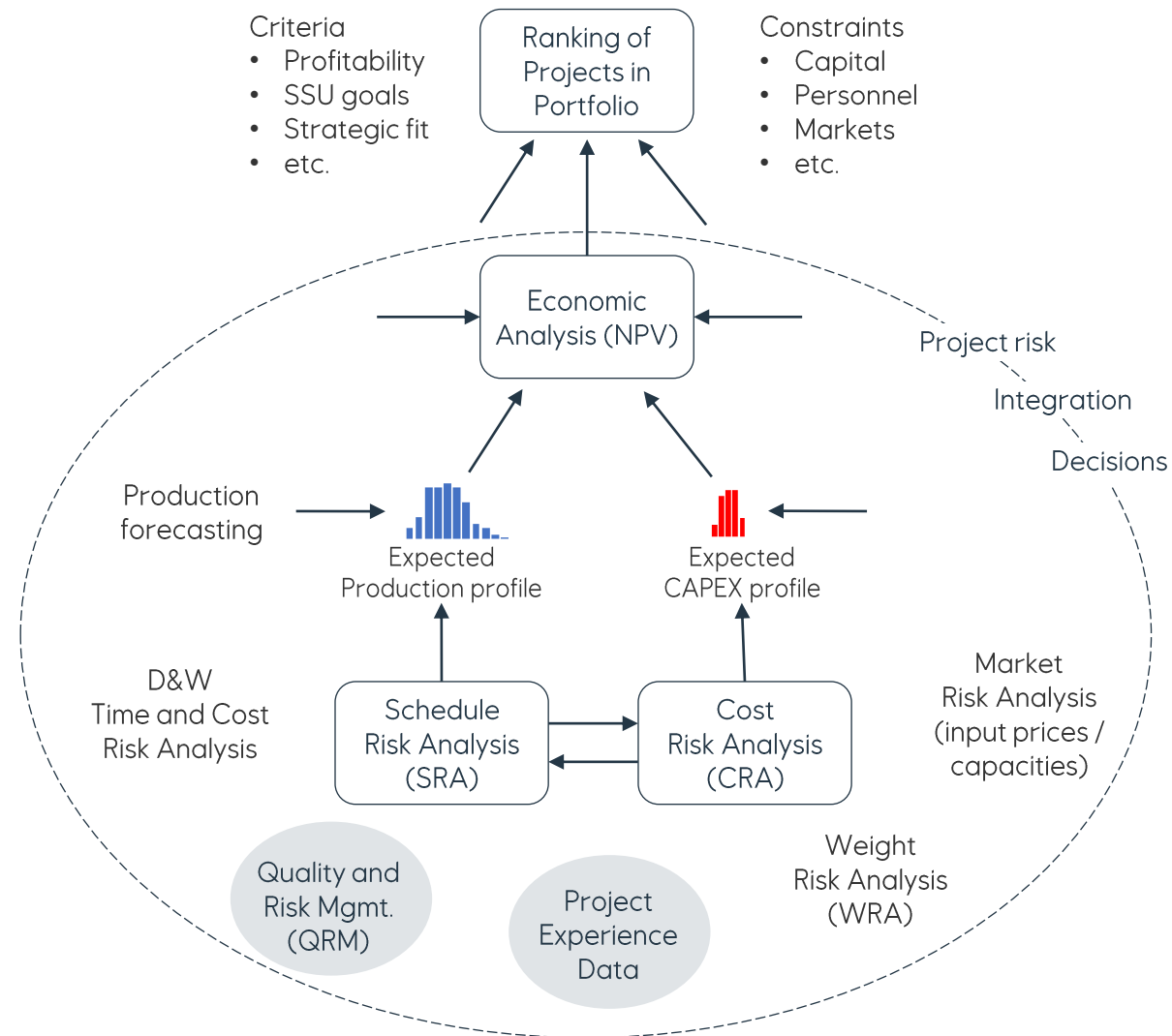
Cost Risk Analysis (CRA)

# Testing for SRA quality on Equinor projects

- The graphic shows expected duration estimated by the SRA at DG3 plotted against actual duration at DG4

- When data is available, standard statistical methods can be used to test hypothesis about SRA output quality.

- In this particular case, it is seen that almost all data points are above the line, strongly indicating that durations are consistently underestimated.

- This supports observations that project teams tends to be too optimistic when quantifying uncertainty, or fail to identify or include important drivers in the SRA, or both.



### DG3 - DG4 Project Duration

Actual Duration @ DG4

Expected Duration @ DG3

Based on Equinor experience data for 24 large O&G projects (anonymised)

# Equinor's focus for improvement

- Develop standardised models and input data requirements for consistent risk analysis across projects

- Simplified and more integrated risk analysis to support early phase Business Case decisions

- Collect and analyse experience data to better support unbiased quantification of uncertainty– less expert judgement

- Explore the use of AI methods to better utilise experience data and improve work processes

- Build the required work processes and skill set – roadmap for change



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- etc.

Ranking of Projects in Portfolio

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- etc.

Economic Analysis (NPV)

Project risk

Integration

Decisions

Production forecasting

Expected Production profile

Expected CAPEX profile

D&W Time and Cost Risk Analysis

Schedule Risk Analysis (SRA)

Cost Risk Analysis (CRA)

Market Risk Analysis (input prices / capacities)

Quality and Risk Mgmt. (QRM)

Project Experience Data

Weight Risk Analysis (WRA)

# Takeaways

- SRA/CRA quality is important because it ultimately could lead to wrong investment decisions

- SRA/CRA quality can only be measured by testing on historical data – although that sometimes is like driving a car only looking into the mirrors

- For a large organisation, the challenge with improving SRA/CRA quality is less about tools and more about changing work processes and competencies