

# The regulation of the future without risk acceptance criteria?

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# Summary of the PSA regulation presentation

- Probabilistic risk indices are knowledge based (and not objective)
- Risk defined as the consequences of the activities, with associated uncertainty
- The goal set by the society for how the petroleum activities shall be regulated:
  - Ensure a minimum world leading safety level (health, safety, environmental protection and emergency preparedness)
  - Continuous improvement of this safety level
- RAC is a method, not a goal (the goal is minimum risk and risk reduction).
- The aim of risk analyses is to understand risk and reduce risk (not verify a RAC)



# $P(A|K)$ and the strength of knowledge

Recognised by:

## Strong strength of knowledge

- Same result when running the analysis by different analysis teams without restrictions on method and data.

Well-known types of platforms in well-known areas doing well-known activities within their design life. Uncertainty is minimal. Risk is well understood.

## Medium strength of knowledge

- Same results only if restrictions on method and data are provided (i.e. methods and data are not sufficiently established)

Developments in new areas  
New activities and concepts (W2W, autonomous vessels, floating wind, LE problems etc.). Some uncertainty. Risk to some extent understood.

## Weak strength of knowledge

- Risk analysis will only give insight into the “risk picture” and possibilities to compare alternatives

New and unproven application (e.g. immature areas). Prototypes. Little data. Unproven methods. Some LE problems. Large uncertainty.



# Risk regulation in the petroleum industry

The use of risk acceptance criteria has historically been seen as a key management tool and means of action in safety and the criteria have a central place in present regulation.

However, the appropriateness of such criteria has been debated for many years. Do they work as intended? Do they contribute to the desired development of the safety level?

Many of the risk analyses that are carried out aim to make comparisons with risk acceptance criteria, although it is clear that the results of these analyses are well within these criteria.

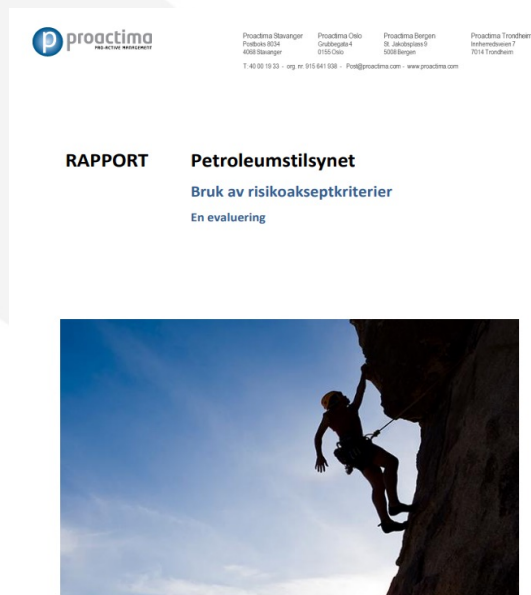
The risk analyses are largely used for 'trivial' verification instead of developing a better system and risk understanding, comparing alternatives and contributing to improvements.



# Two evaluations

What is the best way to regulate to obtain

- a minimum level of safety and
- ensure improvements to be made beyond this minimum level?



# Societal expectations and RAC

Ensure a minimum level of safety and protection for people, the environment and material assets

Improvements beyond this minimum level (so that a high level of safety is achieved)

To what extent do risk acceptance criteria contribute in meeting these fundamental principles?

- Provides an apparent simplicity and clarity in risk management
- Difficult to formulate RAC that fully encapsulates uncertainties
- 'Weak criteria' is the right choice from a business perspective
- Generally, RAC do not stimulate risk reduction and continuous improvement. The alternative is the ALARP principle.
- However, it is difficult to make the ALARP principle work as intended in practice without regulating the underlying process



# RAC to ensure a minimum safety level?

RAC provides an apparent simplicity and clarity in risk management.

However, to ensure a minimum safety level, the use of upper limits for risk is problematic. **A key point here is that uncertainty is a main component of the concept of risk and can only be reflected to a limited extent in probability-based risk indices that indicate an upper limit for risk.**

Positives	Negatives
<p>Qualitative RAC allows for apparent overall assessments of whether the risk is justifiable/acceptable.</p> <p>With low uncertainty (strong knowledge base), quantitative RAC will contribute to good risk management. However, when the knowledge is very strong, RAC can be replaced by specific requirements for a solution (as in the RISP project) in addition to qualitative risk analyzes to uncover surprises.</p>	<p>Important aspects of risk are not covered through use of the method</p> <p>For complex issues, quantitative RAC do not provide good decision support</p> <p>In the case of completely new types of problems, quantitative RAC alone will not provide good decision support</p>



# How different forms of criteria and management principles are linked to uncertainty and knowledge

**Strong strength of knowledge**  
(known technology, traditional solutions)

**Weak strength of knowledge**  
(new technology, untraditional solutions)

«Good practice», e.g. RISP  
or quantitative RAC

Possibly quantitative RAC

Cautionary principle with  
focus on robustness and  
resilience

Qualitative RAC





# RAC to ensure additional improvements

## **Quantitative risk acceptance criteria generally do not stimulate risk reduction, further development and continuous improvement**

- A main problem is that a 'weak' RAC are the right choice from a business perspective
- Society will often emphasize safety more than companies, because the negative effects of an accident will often be greater for society. This can lead to different assessments of how much risk reduction is desirable
- RAC can, due to limited resources, contribute to other safety investments having to be cut, with the result that the overall effect on safety is negative.



# RAC to ensure additional improvements

The alternative is the ALARP principle. However, in practice, it is difficult to make the ALARP principle work as intended.

- The challenge is that it is based on there being an underlying driving force to identify good ALARP measures.
- Instead, often reference is made to cost-benefit analyzes and calculations of expected present value, but this leads to a shift from protection to measures that promote development and growth.



# Possibilities for regulation

## Functional risk management regulation

- The regulation do not describe qualitative risk acceptance criteria
- The regulation describes principles for risk management
- Focus on robustness and resilience
- Focus on processes for risk reduction
- The operators may define their own RAC

## In between solutions

- Some RAC by regulators
- Own RAC
- ...
- ...
- ...
- ...

## Prescriptive risk management regulation

- Prescriptive (calibrated) risk acceptance criteria, continuously becoming stricter.
- Requirements to the industry do develop well founded risk acceptance criteria.
- Variation in the criteria and process depending on strength of knowledge
- Focus on ALARP and the process of ALARP

Risk analysis performed to understand the risk

Risk analysis to verify that risk is acceptable



## Where SoK is not high?

### Functional risk management regulation

- The regulation do not describe qualitative risk acceptance criteria
- The regulation describes principles for risk management
- Focus on robustness and resilience
- Focus on processes for risk reduction

### In between solutions

- ...
- ...
- ...
- ...
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## Where SoK is high?

### Prescriptive risk management regulation

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# About the choice of regime

- The authorities can choose a main category among these regimes but will only to a limited degree be able to control the companies' response to this choice.
- Within all choices of regimes, it is likely that common practice continues more or less as it is today (e.g. the operators relate to or define a number of RAC and the risk acceptance criteria continue to have the same role in their risk management).
- If the authorities' intention is the opposite, that risk management should be based on other principles, there will be a need to clarify the implications of such a shift, including giving practical examples of what a function-based regime or an intermediate solution could look like (which is what we are now doing in our new project).



# Prescriptive risk regulation - recommendations

The use of risk acceptance criteria is today strongly linked to the perception of 'an upper limit for acceptable risk level (typically a probability)', which **does not correspond to how risk is defined.**

**The use of risk analysis as a tool to improve risk understanding should be emphasized** more strongly by the authorities and followed up by the industry.

**Consideration should be given to requiring justification for selected RAC**, in terms of their scope, consistency, format and level.

The worst credible event (WCE) concept is being developed further to give it a stronger professional foundation.

Management review and assessment should be clarified and emphasized more strongly.

With strong knowledge simplifications can be made as we see today within the RISP project.

With very weak knowledge only qualitative risk analyses and criteria will be relevant.

In situations between these, quantitative risk analyzes will be able to provide valuable decision support, but there will always also be a need for qualitative assessments.

A review should be carried out regarding the **types of risk acceptance criteria to specify.**

**Incentives for further risk reduction need to be established.**

The expectations regarding the use of the ALARP principle should be clarified.



# Functional risk regulation - recommendations

The **overall principles for risk management** needs to be clarified.

**The necessary changes in the regulations need to be defined**, along with the implications for the authorities and the industry.

For the industry, such a regime will mean greater freedom to choose and develop risk management based on what is the state-of-the-art and good practice.

As today, the industry will draw up standards and guidelines for how best to carry out risk management.

How to document the qualitative assessment processes can be a challenge but can be solved by development of the risk management processes.

This regime does not imply major change for the regulation. The difference is that functionality is further emphasized. With the proposed regime, **it will be down to the companies to find solutions that meet the overall requirements and principles for risk management.**

The authorities' supervision will change under such a regime. The focus is directed to:

- How the industry to meet the overall risk management principles.
- How they facilitate improved risk understanding (more emphasis on knowledge and robustness/resilience than risk indices).

This can cause challenges in the supervisory activities (audits) as it is not always easy to see the criteria used.



# The 2023 evaluation - ongoing

		Functional risk regulation			...			Prescriptive risk regulation		
Strength of knowledge*		S	M	L	S	M	L	S	M	L
Attributes	Minimum safety level	😊😊	😊😊	😊😊	😊	😊	😊	😊	😐	😞
	Further risk reduction	😊😊	😊😊	😊😊	😊	😊	😊	😐	😞	😞😞
	Competency requirement in industry									
	Competency requirement in regulators									
	...									
	Need for changes in regulations	😞	😞	😞😞	😐😐	😐😐	😐😐	😊	😐	😞
	Need for changes in standards	😞	😞	😞😞	😐😐	😐😐	😐😐	😊	😐	😞😞
	...									





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