OFFSHORE SAFETY DIRECTIVE:
FORWARD PARADIGMS OF RISK AND SAFETY

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What effects Risk/Liability/Compensation?

➤ Novel Activities
  ➤ New Benefits
  ➤ New Risks
➤ New players and stakeholders
➤ Change in Scale of Events
➤ New Location of Events, in what Jurisdiction(s)

➤ The more factors, above, engaged the more the need to rethink liability, compensation, and financial security
Looking Ahead on Liability, Compensation, and Financial Security

➤ Directive reflects a body of knowledge, built on previous experiences and events in the offshore industry

➤ There are on-going events in the offshore industry that might provide insight into the present functioning of the Directive

➤ Some of these are paradigm changing; which also raises a question of how well the Directive functions to raise safety standards for novel and incoming changes in operational activities

➤ These changes will materially impact on policy and planning for liability, compensation, and financial security in advance of operations
Changes Impacting Offshore Safety

➤ Possibilities for Smaller Actors to have Larger Impacts
➤ New Offshore Possibilities – From Elephants to Cows, from Blue Whales to Dolphins
➤ New Resource Risks – Offshore Methane Hydrates, from Deep Rocks to Shallow Mudlines
➤ Improving on Safety Case Implementation
New Offshore Possibilities -- From Elephants to Cows, from Blue Whales to Dolphins

- The improving ability to 4D scan for resources will lead to reduced risk of dry holes while also increasing reliability on volumes in reservoirs.

- Improvements in drilling technology have led to reduced costs thereof, as seen occurring in the onshore shale fracturing developments.

- While this combination of changes has mostly been onshore so far, it is foreseeable that these trends, to commercially develop smaller assets, will extend to the offshore.

- This reduction in capital mass per well could also led to new circumstances in offshore safety planning – same as it did onshore.
  - Smaller Assets in Play
  - Smaller Capital Pools Required
  - Space for Smaller Investors/Operators
New Discoveries – Offshore Methane Hydrates, from Deep Rocks to Shallow Mudlines

➤ Present Offshore Directive presumes conventional petroleum assets, those laying deeply under rock and other geological structures

➤ New offshore actors are moving to develop offshore methane hydrates (OMH):
  ➤ OMH are a methane resource that lays under the mud in the benthic offshore
  ➤ Methane hydrates casually appear as accumulated snow, with the methane molecules locked in molecular-scale ice cages — 85% H₂O and 15% CH₄

➤ The risks shift from “Exxon Valdez” or “BP Macondo” crude oil hazard paradigms to more novel risks of offshore landslides, tsunami, and massive/continuous methane leaking and venting, both into the water column and into the atmosphere, with the associated risks to climate change and loss of oceanic biota

➤ There is also an increased risk of international/transboundary loss of human life

➤ Need to develop awareness of these novel environmental and safety risks, and implement within framework of Offshore Directive, for OMH production will likely arrive in a surprising manner, much as shale fracturing did a decade or so ago

➤ Needs for liability, compensation, and financial security might resemble the early nuclear industry more than the traditional oil and gas paradigms
Map of Conventional Petroleum Assets... vs
Remember, OMH are both methane and freshwater resources
Forecasted OMH in EU Waters
Technology is there now – Commercial terms developing

Japan reports successful gas output test from methane hydrate

May 8 Japan’s trade ministry on Monday reported success in producing gas by extracting methane gas from methane hydrate deposits offshore Japan’s southern island of Kyushu.

The tests being run at two different wells are the first since 2013, when Japan conducted the world’s first-ever extraction of gas from offshore deposits of methane hydrate – a frozen gas known as "flammable ice".

Japan’s Ministry of Economy, Trade and Industry (METI) said the methane hydrate production tests will continue for a combined four to five weeks. Japan’s first methane hydrate tests in 2013 ended abruptly after less than a week due to problems with the flow of gas into the well.

Japan, which imports nearly all of its energy sources, has been aiming to launch private sector commercial production of methane hydrates by between 2023 to 2027, but METI officials have said the goal will still be a challenge as many obstacles remain to be overcome.
Novel Safety Risks from OMH Extraction

Figure 7.5: Illustration of what happens when a sediment slope failure occurs above a gas hydrate layer and how large quantities of gas may be released (after Maslin, 2004; adapted from Kvenvolden, 1998).
Forecasted Area of Subsea Instability (Landslides, Tsunami)

Fig. 2. Regional distribution of main areas for submarine landslides.

Evidence of Ancient Landslides
Improving on Safety Case Implementation

➤ It is difficult to prove that the “paper” exercise of the safety case/major hazard report actually translates into meaningful action on the ground.

➤ In particular, to what extent is the key concept of the safety case/MHR being a living document actually implemented in practice?

➤ Does industry remains reactive, rather than proactive in the way that the idea of the living document would imply - do blind spots remain?

➤ ‘Borrowing’ from the Banks?

➤ Might hypothetical scenario “stress testing” be a method of interest

➤ Team of diverse stakeholders could design hazard scenarios, which the operators could simulate across their systems to learn of capacity to respond to events

➤ Discovery of preparedness, or lack thereof, could enable parties to engage in robust prevention planning