

# What makes a task safety critical?

Human Factors in Control @ ABB

**Sondre Øie**

26 April 2016

Ungraded

## Some self-advertisement...

---

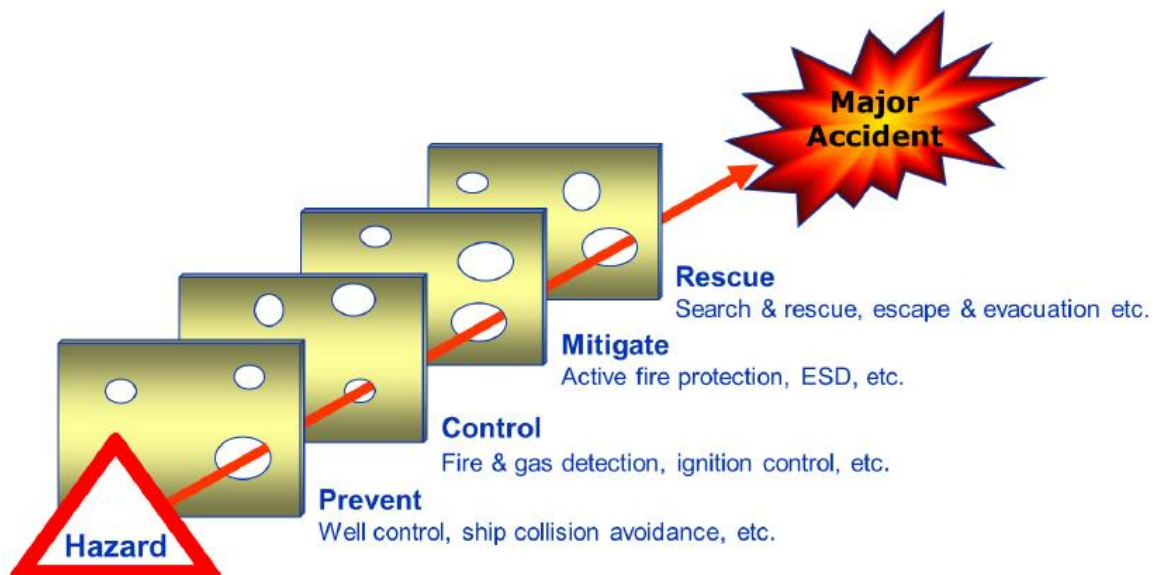
- Joined DNV (now DNV GL) in 2008
- Risk Management Solutions (2008-2010)
  - Safety management & leadership
  - Safety culture diagnosis and improvement
  - Risk management during organizational change
- Operational safety (2010-2014)
  - Safety barrier/ risk management
  - Human Factors Engineering
  - Human reliability assessment
- Drilling & well (2014-present)
  - Technology qualification
  - Blowout risk analysis

Ungraded

## Definitions, definitions, definitions...

- *Tasks where human performance contribute positively or negatively to major accident risk, through either:*

- *Initiation of events;*
- *Detection and prevention;*
- *Control and mitigation; or,*
- *Emergency response.*



- *Operational barrier element:*
  - *A task performed by an operator, or team of operators, which realizes one or several barrier functions.*

# Why focus on safety critical tasks?

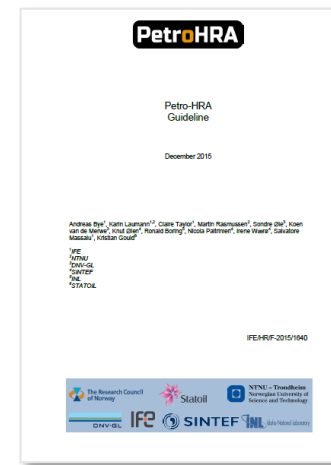
- A task-based approach allows systematic identification, analysis and management of human contribution to major accident risk
- Recently, the concept of safety critical tasks has become an integrated part of key approaches to safety management:
  - Barrier management, e.g. PSA and NSA report
  - Quantitative risk analysis (QRA), e.g. Petro-HRA
- Supports risk-informed decision making, e.g. by reducing uncertainties inherent in assumptions previously made about human performance (e.g. in QRAs)
- Still some way to go, but the ball has started rolling



Source: www.ptil.no



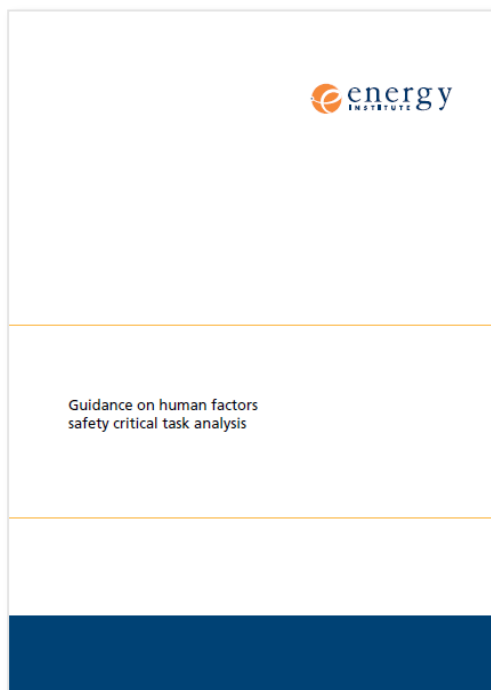
Source: www.rederi.no



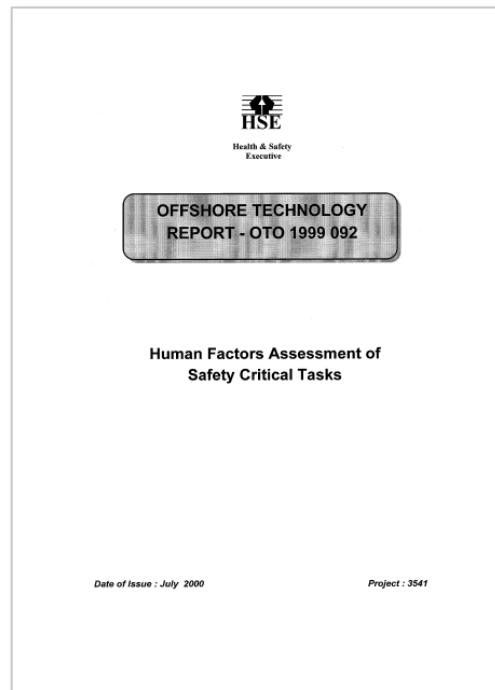
Source: To be issued

Ungraded

## Guidance currently available



[www.energyinst.org/](http://www.energyinst.org/)



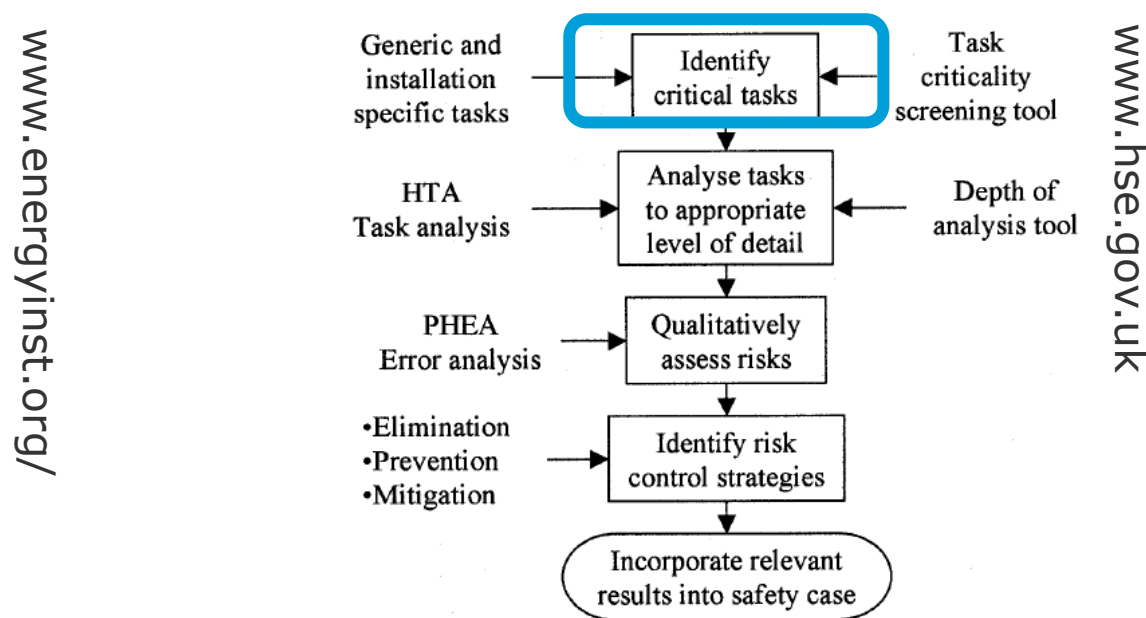
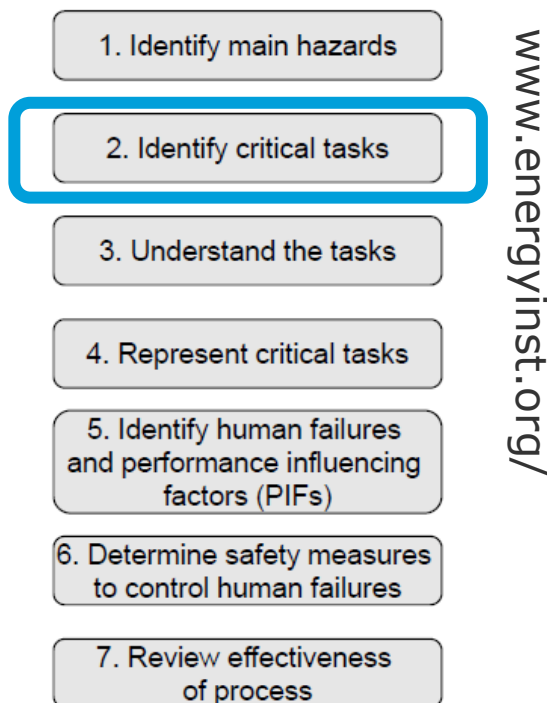
[www.hse.gov.uk](http://www.hse.gov.uk)



Source: [www.rederi.no](http://www.rederi.no)

Ungraded

# Looks simple, but can in fact turn into a slippery slope...



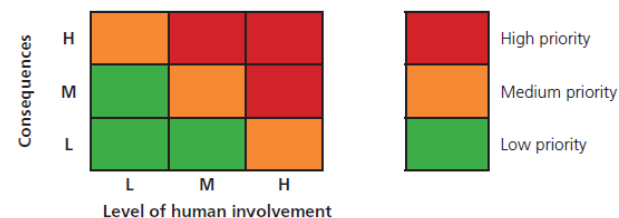
Ungraded

# Tools for task identification and screening

- Some are too simple;
  - E.g. does not manage to distinguish between medium and highly critical tasks
- Some are too complex;
  - E.g. require a lot of information about the task to make ranking, thus time consuming
- Top-down vs. bottom-up dilemma

Consequences of human failure	Example guidance
High (H)	A human failure could result directly in realisation of a MAH
Medium (M)	A human failure could escalate to a MAH if various other barriers fail
Low (L)	A human failure should not lead directly or indirectly to a MAH

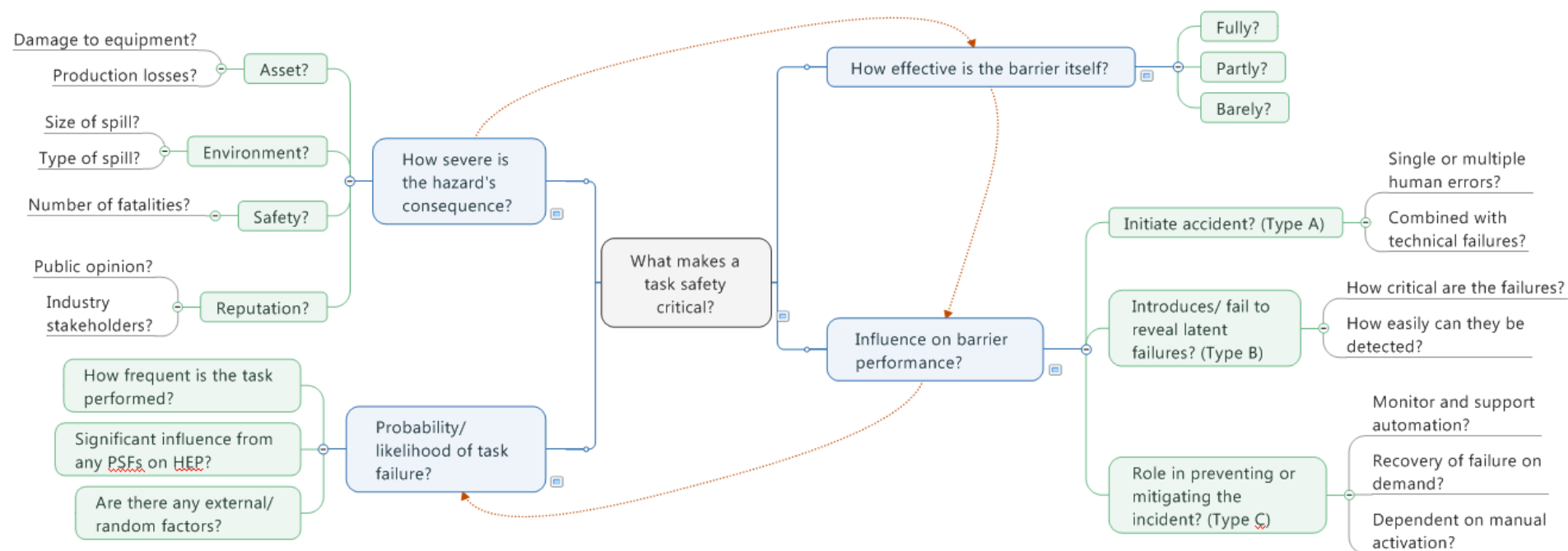
Level of human involvement	Example guidance
High (H)	Task involves extensive human interactions with safety critical equipment or processes
Medium (M)	Task involves a mixture of human tasks and automated processes
Low (L)	Task involves totally automated process (however, do not overlook maintenance of automated equipment)



Diagnostic	Definition	Rating Guide and Score		
		Low (1)	Medium (2)	High (3)
1. How hazardous is the system involved?	Task involves systems with intrinsically hazardous substances or conditions	Small amount of low hazard substance / condition	Large amount of low hazard or small amount of a high hazard	High amount of a high hazard / condition
2. To what extent are ignition sources introduced into / during the task?	Task uses or may produce heat, sparks or flames	Static spark or low current electrical supply	High current electrical supply, sparks from grinding	Flames for welding or cutting, internal combustion engines
3. To what extent does the task involve changes to the operating configuration?	Task involves valve moves, temporary connections, change to process flows.	Simple changes to valve process status.	Complex or multiple changes to valve and process status or temporary connections	Complex and multiple changes and temporary connections
4. To what extent could incorrect performance of the task cause damage?	Deviations from best practices may have detrimental effect on equipment integrity.	Equipment weakened with potential to cause damage in the long term.	Equipment requires repair but maintains integrity.	Equipment fails catastrophically.
5. To what extent does the task involve defeating protection devices?	Task requires bypass or override of indications, alarms or trips.	Disabling gauges, meters or electronic displays.	Disabling alarms.	Overriding trip systems or isolating safety valves.

Ungraded

# Roadmap to task criticality



- If you have identified 100 tasks, this is a lot of questions to ask!!



## Example **HOLD**

---

Ungraded

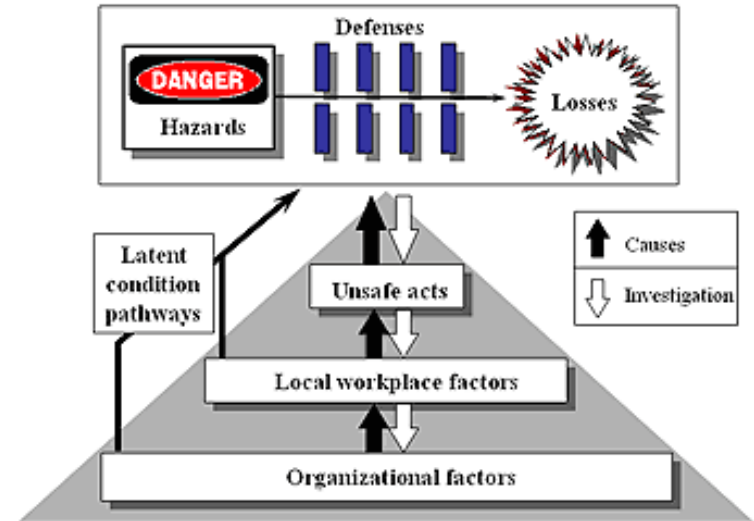
## Infiltrate and collaborate!!

Maybe not all, but many SCTs can be identified and screened through other activities

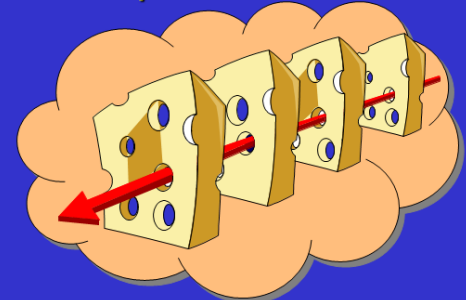
- HAZOP/HAZID
  - Either as safeguards/ barriers, or
  - as “valve left inadvertently open” (pure omissions)
  - These are typical process “deviations”, potentially causing hazardous events
- LOPA
  - Follow-up of the HAZOP
  - SIS/SIF (alarm response) or Initiating Events
- QRA/ reliability assessments
  - Not many tasks are modelled, the QRA is high-level or coarse
  - Some times tasks are part of the event or fault tree model, “Human Failure Events”
- FMEA/FMECA/FMEDA
  - “Detection and recovery” column
  - Alarm response, inspection, maintenance etc.

Ungraded

## Sharp end vs blunt end **HOLD**



### *The importance of culture*



Only culture can reach all parts of the system.  
Only culture can exert a consistent influence,  
for good or ill.

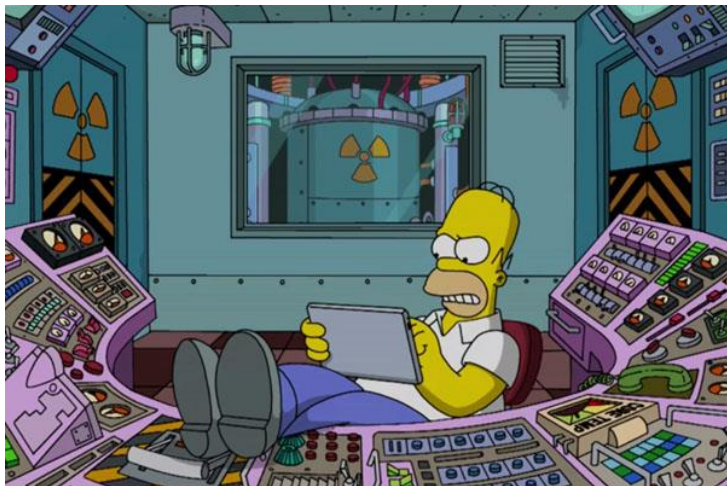
## Conclusion **HOLD**

---

- Recommendations
- Unsolved issues

Ungraded

# Questions?



Kilde: [www.youtube.com](http://www.youtube.com)



Kilde: [www.youtube.com](http://www.youtube.com)



Kilde: [www.youtube.com](http://www.youtube.com)



Kilde: [www.youtube.com](http://www.youtube.com)

Ungraded

# Thank you!

**Sondre Øie, Senior Engineer**

sondre.oie@dnvgl.com

+47 948 61 628

**www.dnvgl.com**

**SAFER, SMARTER, GREENER**

**Ungraded**