

# **Safety on an edge – A possible organized trade-off between long-term safe work performance and regularity in production processes**

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# Introduction

- Case study of a FPSO- vessel
- Goals for the research project:
  - Safety assessment that emphasize organizational factors
- Systemic relations in an organization that challenge the long-term safety level

# Method

- **Examination of HSE-statistics**
  - Analysis of reported unwanted events
- **Survey**
  - 154 employees completed questionnaire (response rate 71 percent)
  - Onshore and offshore personnel
  - Employees from both operating firm and contractors
- **Interviews**
  - Included 186 employees, onshore and offshore
  - Conducted on the FPSO- vessel
  - Interviews were recorded and categorized into thematic fields

# The FPSO vessel

## Records

- Economical profitable
- High reliability in production

## Organization

- The first low-manned oil production installation on the Norwegian shelf
- 35 crew members
- Horizontal work processes
- Multidisciplinary team
- Minimal use of work orders, written reports and formal control routines
- Safety barriers are integrated in the work processes (several systematic tools such as pre-work discussion, HSE time out etc.)
- Only 2 decision levels in the line management
- Condition-based maintenance philosophy
- Preventive maintenance and modifications are carried out by contractors

## Technology

- The use of standardized established technology
- A vessel design that support the work processes
- Extended use of information technology

# Findings from the HSE- statistics

Year/Unit	2003	2004	2005	2006	May 2007
FPSO vessel studied	3,5	8,6	4,9	3,5	3,7
Mean for all installations			3,4	2,7	2,7
Goal for the FPSO studied			2,4	2,4	2,4

Number of very serious HSE incidents per million work hours

Year/Unit	2005	2006
FPSO vessel studied	2,8	5,9
Mean for all installations	7,0	8,2

Number of personnel injuries per million work hours

# Findings from the survey

Question	Ratings at scale value 5 (Good)	Ratings at scale value 6 (Very Good)	Mean
How will you rate the overall safety in your work situation?	61 percent (n=91)	25 percent (n=28)	5.1 (n=148)
How will you rate the overall safety at [the vessel name]?	59 percent (n=87)	26 percent (n=38)	5.1 (n=150)

Rating of experienced safety (scale from 1 to 6 where 1 is very bad and 6 is very good)

- 97 percent of the employees agreed in statement regarding their possibility to always prioritize safety
- In addition 89 percent agreed in statements regarding the management's willingness to prioritize safety
- 93 percent of the employees stated they felt safe when considering risk in their daily work
- 92 percent said they never or very rarely had to put themselves in hazardous situations in order to carry out their work

# Findings from the interviews

## Factors regarded as contributors to safe operations

- Employees and managers from both operating firm and contractors claimed to have excellent attitudes towards safety
- The formal organization was regarded as practical and rational in order to fulfill the goals of the organization
- Responsibilities and lines of authority were known and understood throughout the organization
- Design of the ship and the formal organization helped to establish a sense of a thriving work environment
- Thorough knowledge of the operations of the ship

# Indications of a safe organization

- Reasonable HSE results
- Survey/Interviews:
  - Experience of a (1) high level of safety, (2) a clearly set organization, (3) thriving work environment, and (4) a thorough knowledge among the crew members
- High reliability in production
- Economical profitable



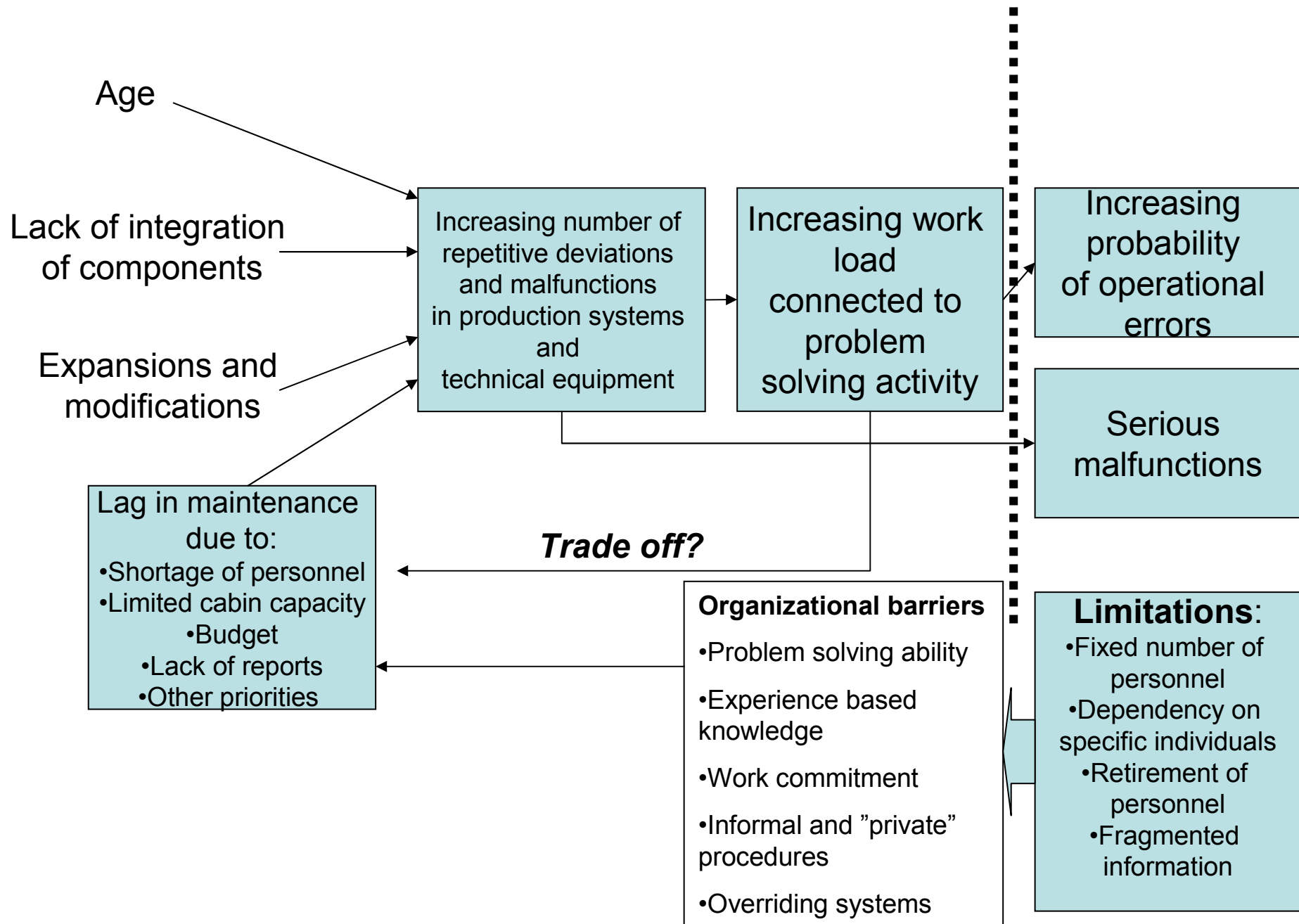
# Findings from the interviews

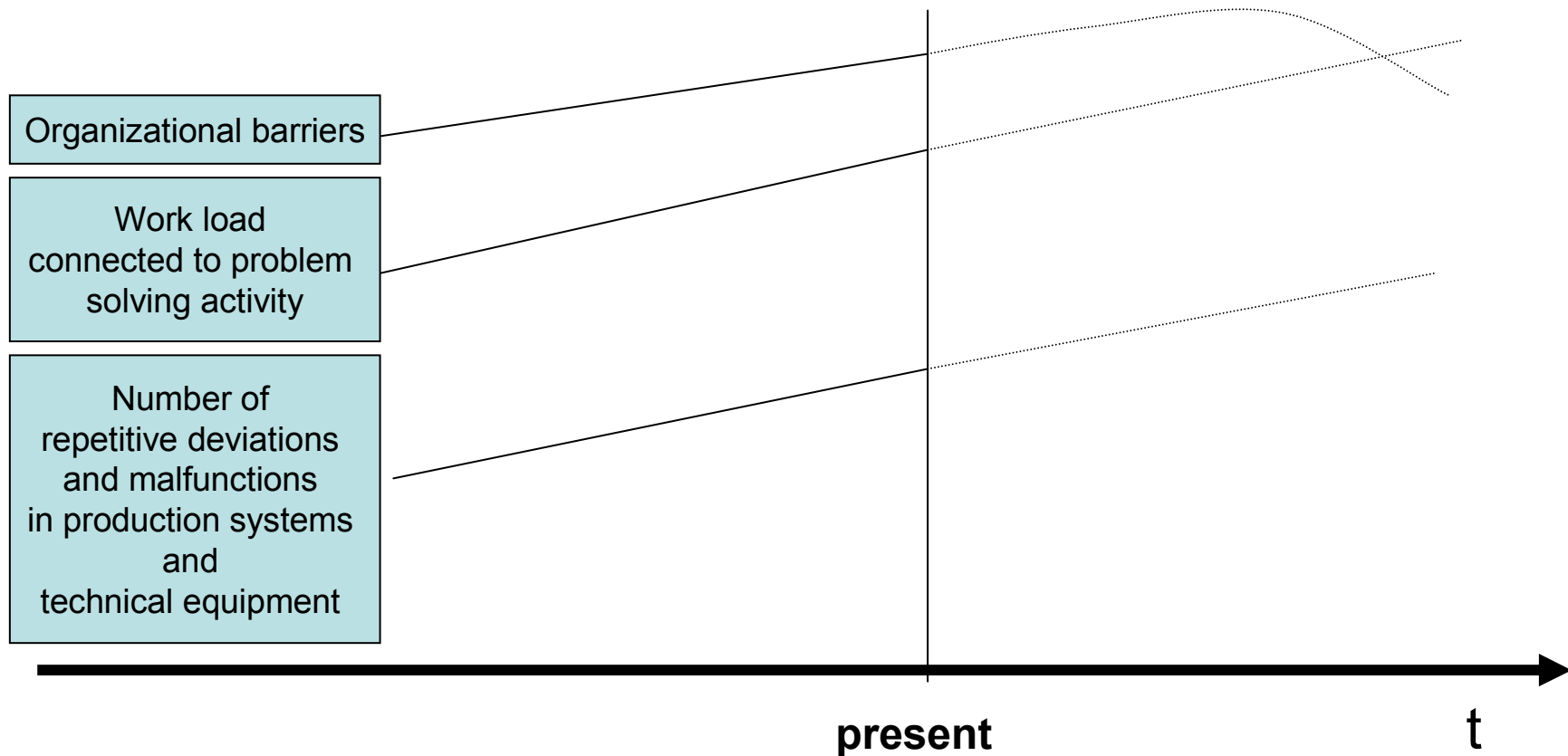
## Challenges to safe operations

- Too many repetitive malfunctions and deviations on the production system
- Modifications over time results in a complex technical system
- Experience of shortage of personnel with the “right” experience and qualifications
- Dependency on specific individuals with their own “private procedures”
- Custom to aberrations from normal prescribed practice
- Established truths among the majority were seen on as difficult to contradict

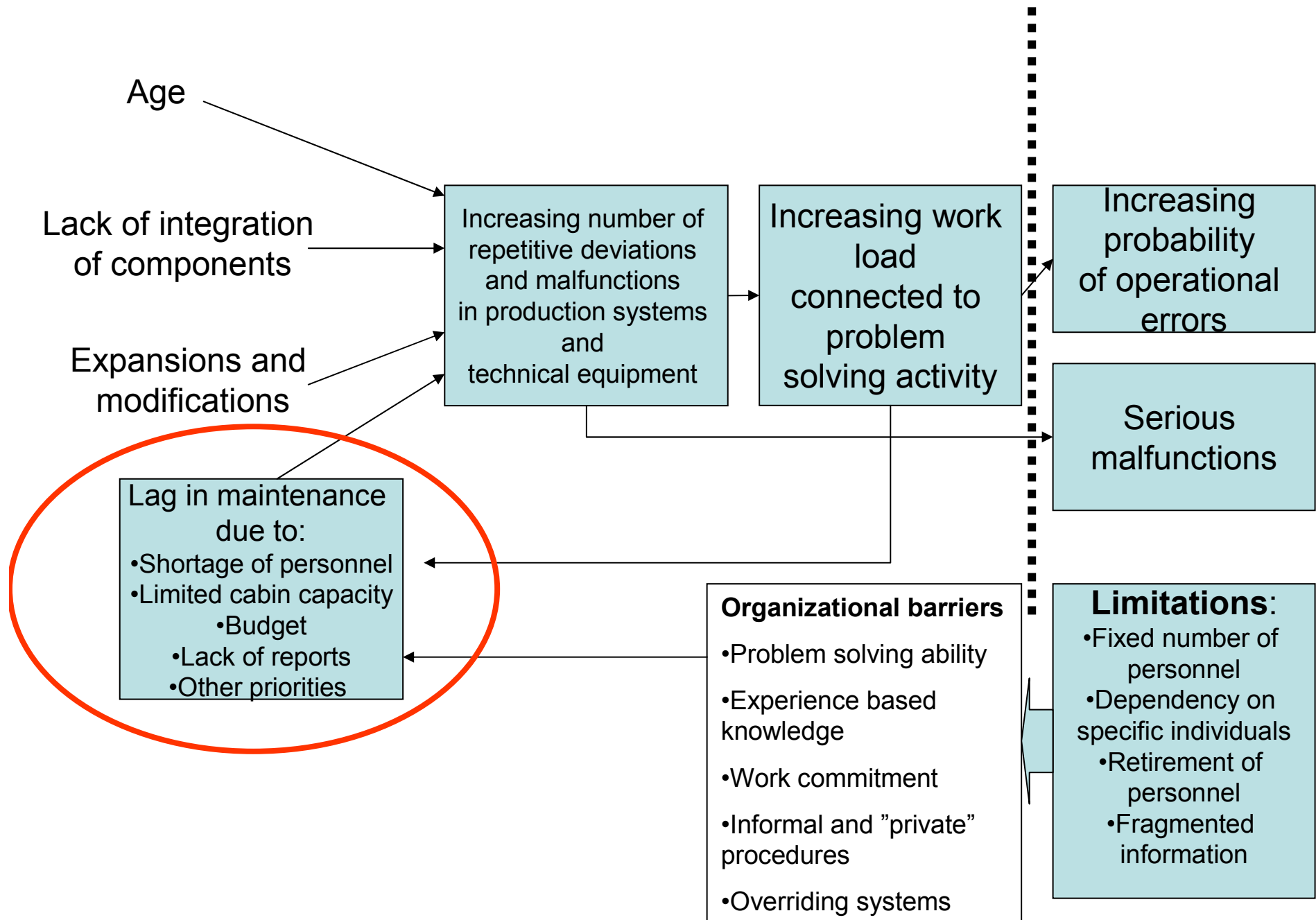
*“They who have been here for a long time, they have fat books containing tricks and rubbish, [on how to] fool the systems”* Employee from the operating firm

*“We are very good at “over-bridging”. I was not used to this on my previous work place. Work permit was required”* Employee from the operating firm



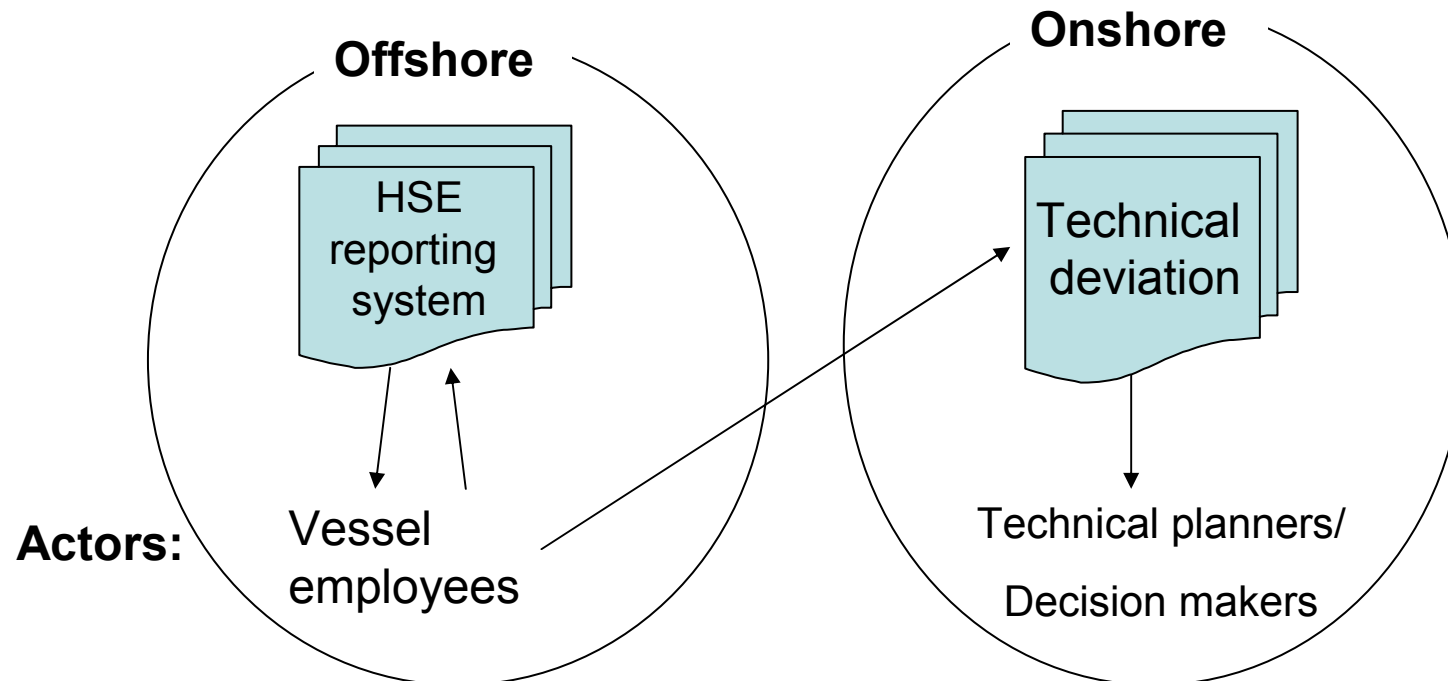


Disaster Incubation Theory (Turner & Pidgeon 1997): During a long period (incubation time), warning signals are neglected. This is explained as a result of (1) a dominant belief that things will not go wrong, (2) fragmented information and (3) sloppy management



# Why are warning signals and possible hazards neglected among crucial decision makers?

- Conceptual division between HSE incidents and technical malfunction due to a separation between a HSE reporting system and a technical deviation reporting system
- Decisions regarding respectively HSE measures and technical long-term corrective maintenance are made by different actors



# Why are warning signals and possible hazards neglected among crucial decision makers?

- Decision-makers concerning long-term corrective maintenance get bounded information
  - Limited capacity to run (1) production, (2) carry out extension project and (3) corrective maintenances simultaneous
  - Extension projects of the production system are regarded as profitable investments, and the repair malfunction is regarded as extra maintenance costs
  - Practice of under-reporting
  - A dominant opinion in the organization that the safety standards are excellent

# Conclusion

- The survey and interviews indicate that there is a dominant belief that the organization has a high level of safety
- A dominant belief that things will not go wrong seems to overshadow signals of malfunction that may represent a threat to the safety level
- This process of *bounded epistemology* is supported by a division between an HSE reporting system and technical deviation reporting system with different decision-makers having limited bilateral information flow
- This may produce a systemic “trackless” trade-off between long-term safe work performance and regularity/extension in production processes