NTNU

Norwegian University of
Science and Technology

Enhancing the basis for CRM training for well operations crews:

Risk influencing factors in offshore drilling

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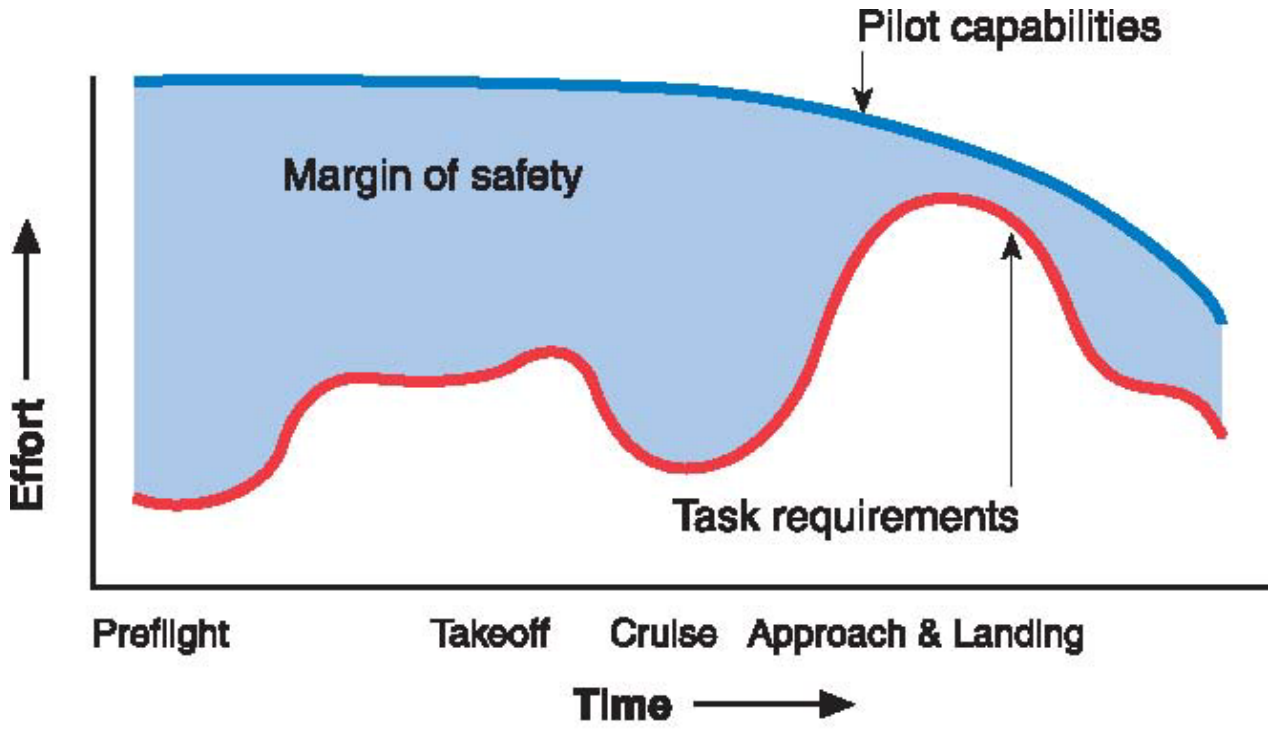
Agenda

- Introduction
  - The call for more focus on HOF in offshore drilling: Macondo, the «Tenerife moment» for offshore drilling
- HOF in Aviation
  - Origin
  - Content
  - Evolution
- Guidelines for CRM in offshore drilling
- The multi level risk model
- Summary

Crew Resource Management

Situational Awareness (How to achieve, maintain, & recover)	**Coordination** (Teamwork & Conflict Resolution)
Communication (Barriers & Efficiency)	**Decision Making** (Risk Management & Problem Solving)
Task Management (Standards, Priorities, Delegation)	**Mission Planning** (Before, During, & After)


Pilot capabilities
Margin of safety
Task requirements
Effort
Preflight
Takeoff
Cruise
Approach & Landing
Time


MITIGATE
CONSEQUENCES
OF ERROR
TRAP ERROR
AVOID ERROR

Problems and evolution of CRM in aviation

- Detached from operational challenges
- Theoretical; «psycho babble» / «charm school»

- Problems with acceptance from crew

- Inclusion of scenarios
- Simulator training
- Line Operations Flight Training (LOFT)
- Line Operations Safety Audits (LOSA)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HOF in Offshore drilling

- Existing HOF approach in Offshore drilling directed towards technical improvement
  - Function/task analyses, ergonomics/layout, access, HMI etc.
- CRM training programs are directed towards less tangible issues:
  - Leadership, stress, situation assessment, communication etc.
- Transferring CRM training concepts from aviation to offshore drilling requires sensitivity to:
  - The «nature» of the tasks
  - Operating culture, environment and influences

Guidelines for CRM in Offshore drilling

- Energy Institute (2014):
  - Guidance on CRM on Non-technical skills training programmes
- International Oil and Gas Producers (2014):
  - 1. CRM for well operations teams
  - 2. Guidelines for implementing well operations CRM training
- Recommended syllabus, establishment of training basis
  - Task analysis and Safety critical task analysis
  - Training needs assessment / Gap analysis (Current level of competence)
- Basic course
  - Demonstrate how skillset can be used and influenced by individuals, local workplace conditions and organizational culture

SCTA

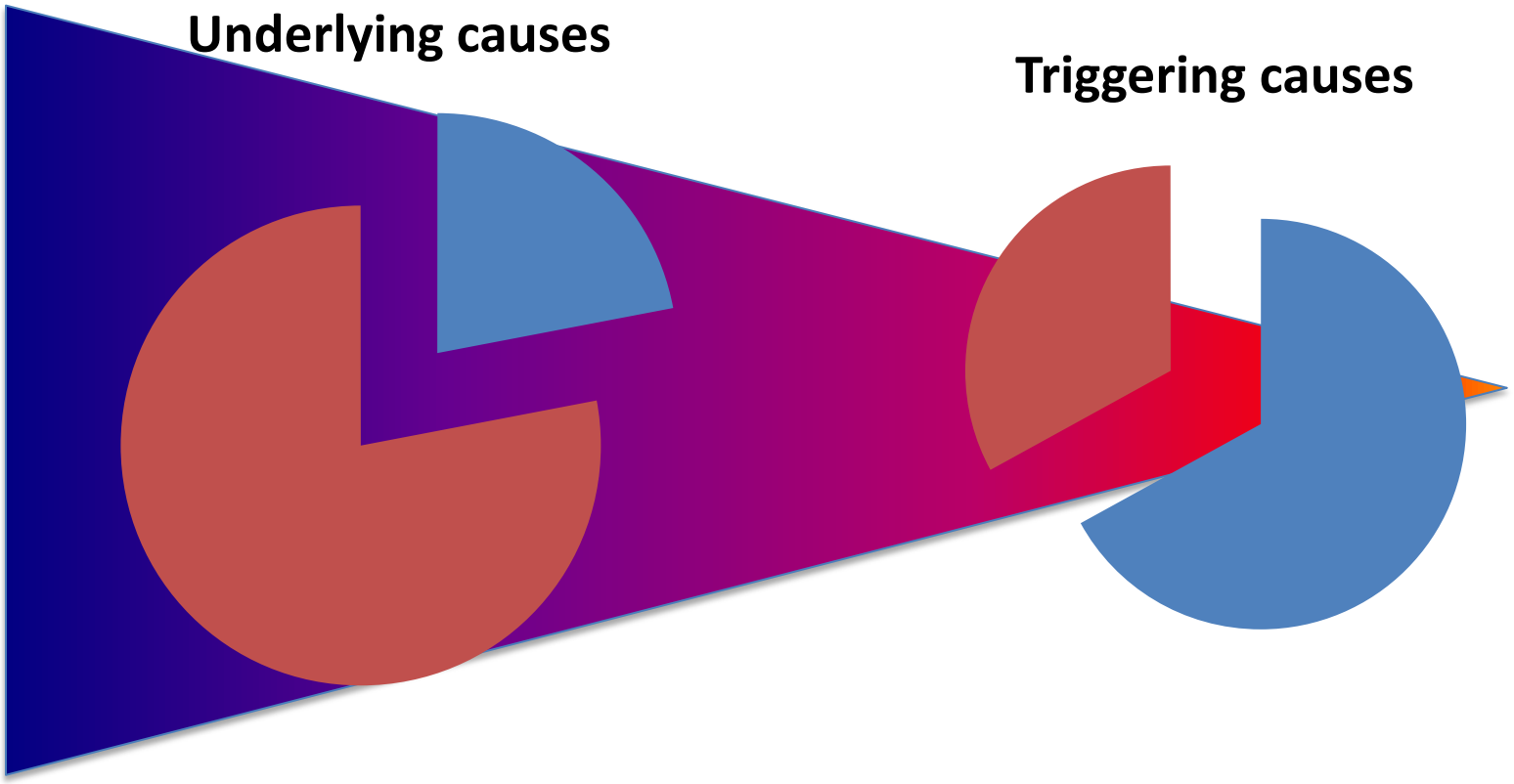
Main inputs		Main outputs
✓Existing safety reports and risk assessments ✓Site layouts and descriptions	1. Identify main hazards	✓List of MAHs ✓Major hazard operations and areas of site
✓Existing safety reports and risk assessments ✓Procedure manuals, discussions with staff	2. Identify critical tasks	✓List of safety critical tasks ✓Prioritisation of such tasks when many MAHs
✓Written procedures, checklists, job aids ✓Interviews, interactive observation	3. Understand the tasks	✓Full understanding of safety critical tasks ✓Who does what, when, in what sequence, etc.
✓Outputs from step 3 ✓Methods such as HTA	4. Represent critical tasks	✓Breakdown of tasks in tables or diagrams ✓Sufficient detail for analysis in steps 5 and 6
✓Task representation from step 4 ✓Methods such as human HAZOP	5. Identify human failures and performance influencing factors (PIFs)	✓List of potential human failures & consequences ✓PIFs and current safety measures
✓Outputs from step 5 ✓Hierarchy of potential risk controls	6. Determine safety measures to control human failures	✓List of potential additional safety measures ✓ALARP demonstration and documentation
✓Trials of SCTA ✓Experience from mature use of SCTA	7. Review effectiveness of process	✓Recommendations for improved SCTA quality ✓Recommendations for improved resource use

Guidelines summary

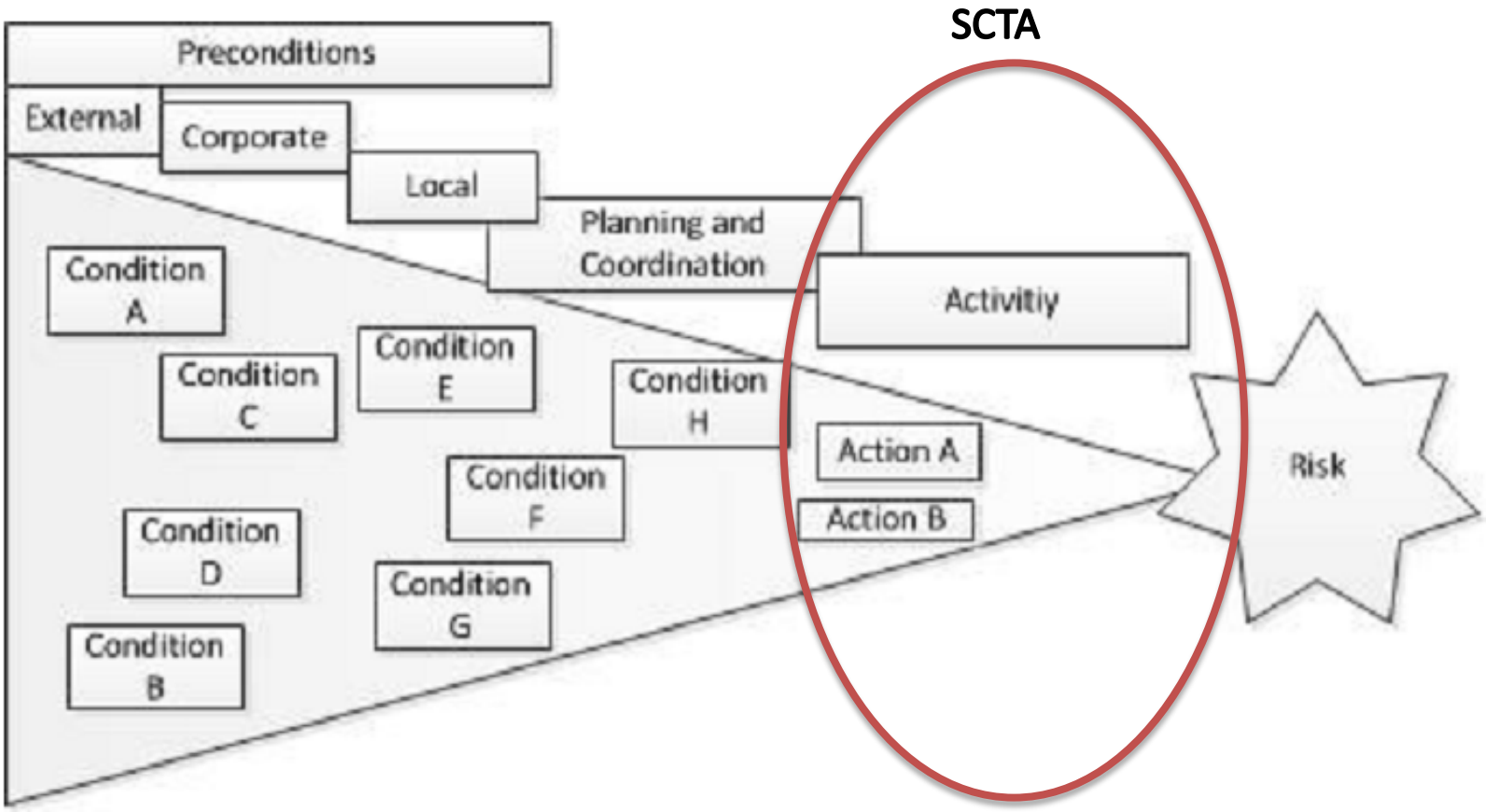
+ Recommended syllabus in accordance with state of the art
+ Solid recommendations for program design
+ Considers implementation issues and acceptance

- Are major accident factors covered well enough?
- Root causes and organizational influences?
  - Conflicting objectives
  - Subcontractors and operator interest conflicts?
  - Blunt end – sharp end problems?
- Issues that are not directly linked to tasks / safety
- Basis in studies intended for design and mitigating operator error

Causes for well control incidents



Broadening the scope



Planning and coordination layer

- Planning and coordination:
  - Consists of factors related to operational planning, procedures and resource management (competence, manning levels etc.).
  - Risk management activities such as a well specific risk register belongs to this layer. So do DOPs.
  - Mix Onshore / offshore
  - Produce information intended for use in the sharp end: Problems with plans and risk registers, e.g. copy paste from similar wells: Difficult to use in practice.
  - Coordination with subcontractors

Preconditions layer

- Static, slow moving properties. Divided into three categories:
  - External:
    - Weather, geological conditions
  - Corporate:
    - Company procedures, philosophies and strategies and systems used
  - Local:
    - Installation specific factors. QRA, specific procedures and technical documentation. Assumtions and info in the QRA is likely to contain information that can be used in operational risk management. This document is rarely, if ever, used in practice
- Framework conditions influencing pressure for production etc.

Summary

- The Guidelines from EI and IOGP is a good start for introducing HF&O factors in offshore drilling
- Experience from aviation suggests we need increased sensitivity to implementation issues
- Commonly identified root cause factors in major accidents should be included to a larger degree
- A multilevel risk model can provide us with a framework for broadening the scope and understanding challenges in offshore drilling that needs to be adressed in training design

Thank you for your attention!

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