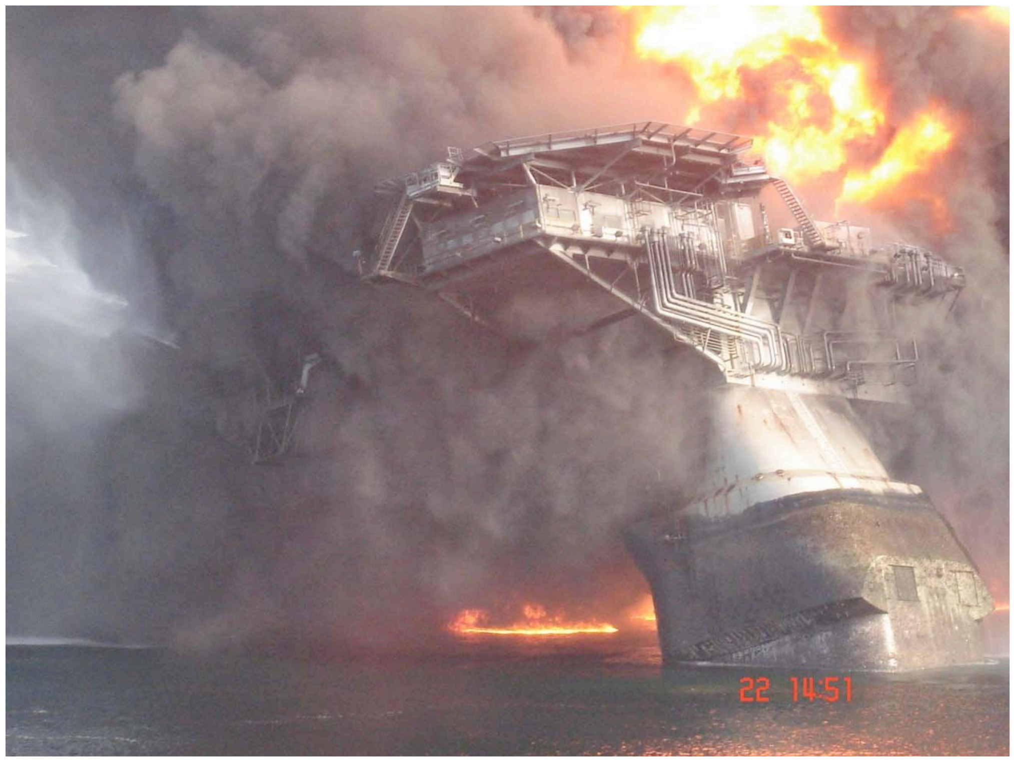

Analysing the human contribution to risk in the UK Offshore Industry

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IMT, HSE Energy Division - Offshore

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......the good, the bad & the ugly from a regulatory perspective....

Content

1. Background (who, what, where & how?)
2. Managing the human contribution to risk.
3. What does ‘good’ look like?
4. Getting it wrong – the bad & the ugly.
5. Conclusions

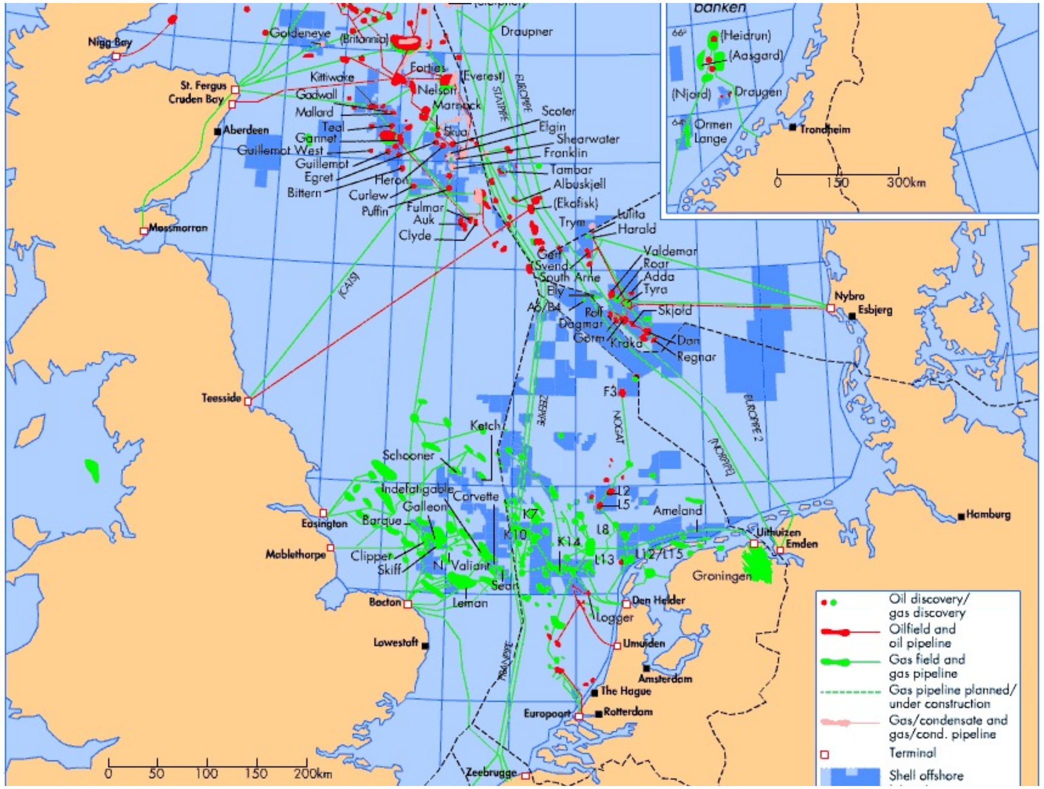
Background (who, what?)

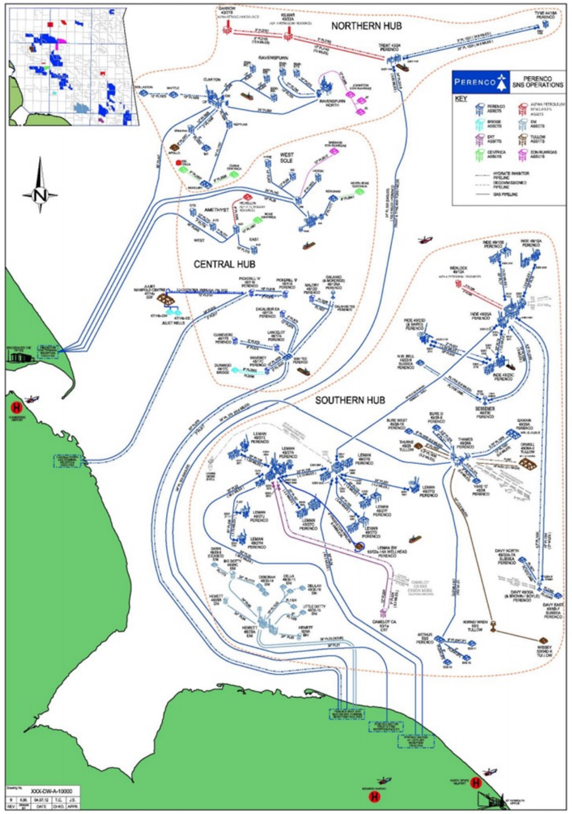
- HSE (Energy Division) is responsible for regulating health and safety matters offshore.

- Focus is preventing major incidents associated with the loss of containment of oil and gas that could result in multiple fatalities or injures, or loss of infrastructure critical to the economy.

- Key regulatory activities are:
  - Inspecting installations
  - Investigating incidents
  - Following up concerns
  - Assessing safety cases

Background (where, how?)





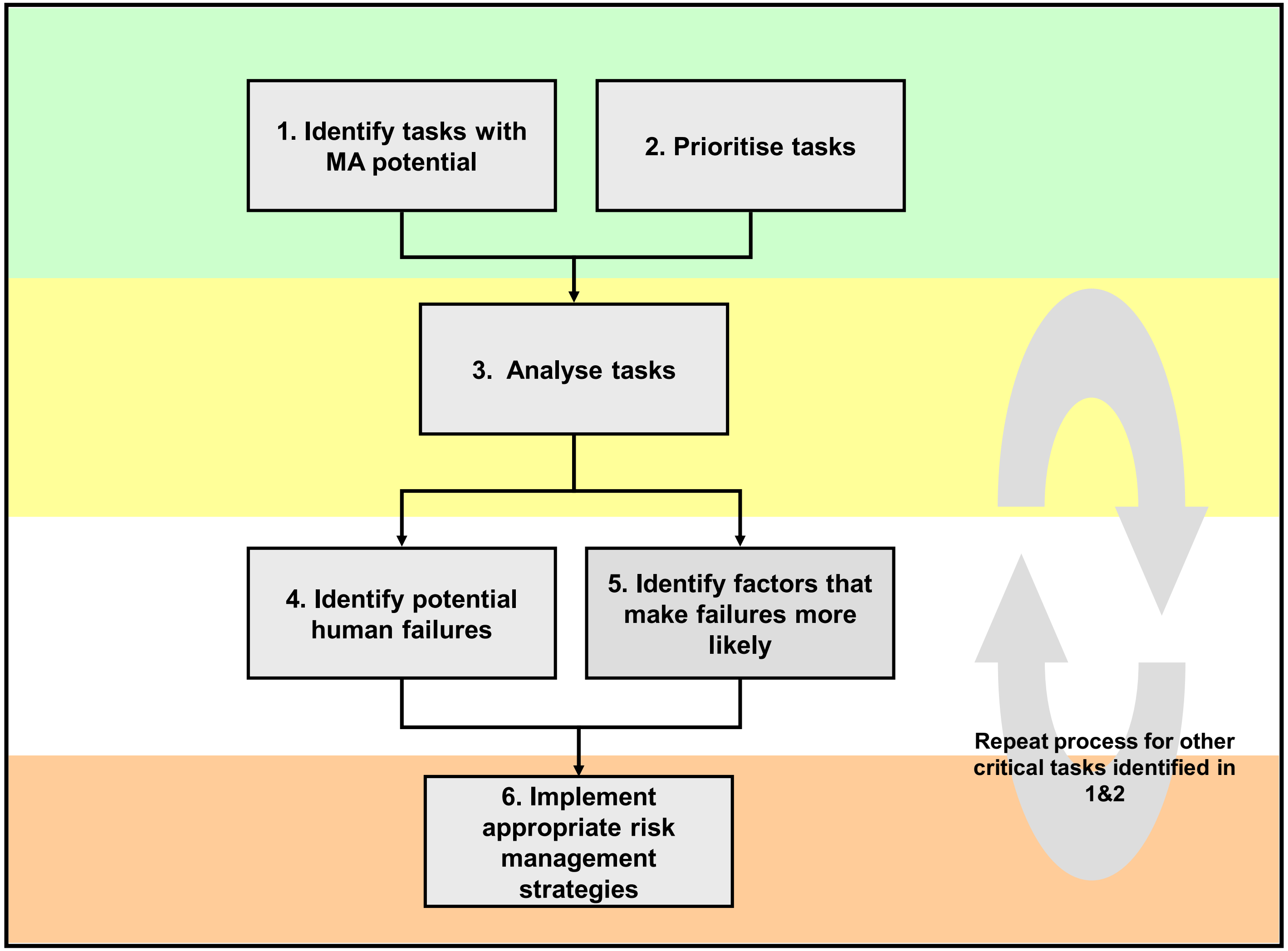
HSE Energy Division - Offshore

- Aberdeen – IMT & Technical Specialists
- Norwich – IMT.
- Bootle (Liverpool) - Technical Specialists

Legal requirement to manage & control the human contribution to risk

- Identify human errors that can cause or contribute to a major accident sequence
- Demonstrate that the *human* risks are being controlled to ALARP
- Safety Critical Task Analysis (SCTA) is a method of analysing the human contribution to risk
- HSE OTO 1999 092: Human Factors Assessment of Safety Critical Tasks
- Energy Institute 2020: Guidance on Human Factors Safety Critical Task Analysis (2nd Edition)
- HSE 2021: The Offshore Management of Human Factors Inspection Guide: https://www.hse.gov.uk/offshore/ed-human-factors.pdf

The main steps to carrying out SCTA

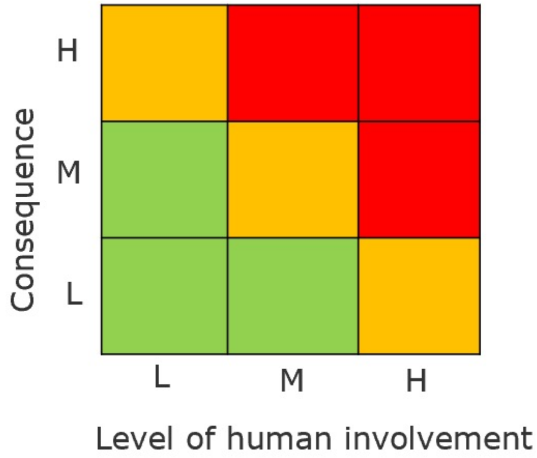


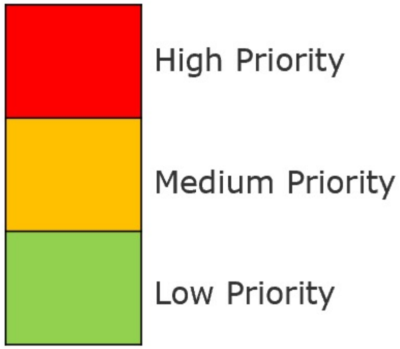
Step 1: Identify Critical Tasks

Inputs:

- Risk analysis from safety case/report (e.g. bow-ties);
- HAZIDs, HAZOPs, Hazards and Effects Register, SECE identification reports etc.
- Investigation reports, audit findings or regulator inspection letters;
- Concerns about potential for human error raised in any other forum (e.g. Elected Safety Representatives or experience from reference sites);
- Team approach – relevant technical and operational experience

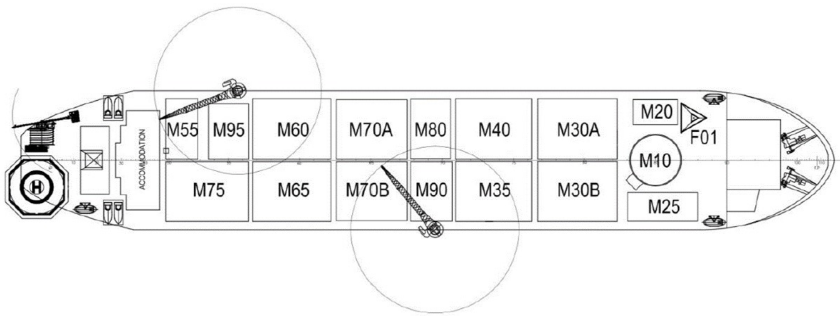
Step 2a: Prioritise Tasks for analysis

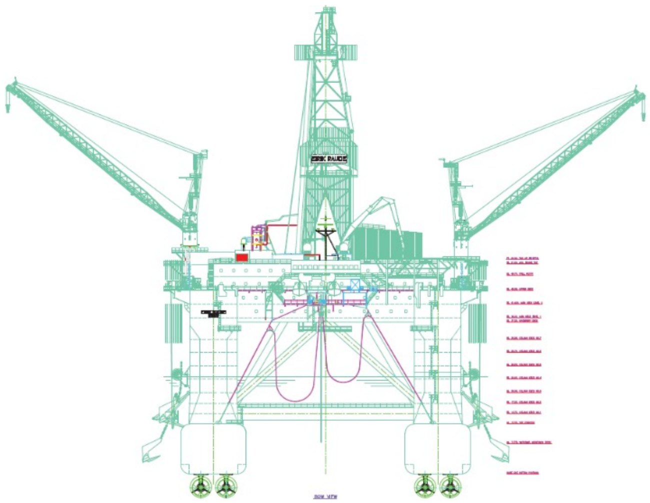




Diagnostic	0	1	2	3	Score
How hazardous is the system involved?					
Does the task involve introduction of energy/ignition sources?					
Changes to operating configuration?					
Potential for error?					
Safety systems affected by task, e.g. inhibits, overrides, defeats etc.					

2b: Screening tasks by SECE/zone/system

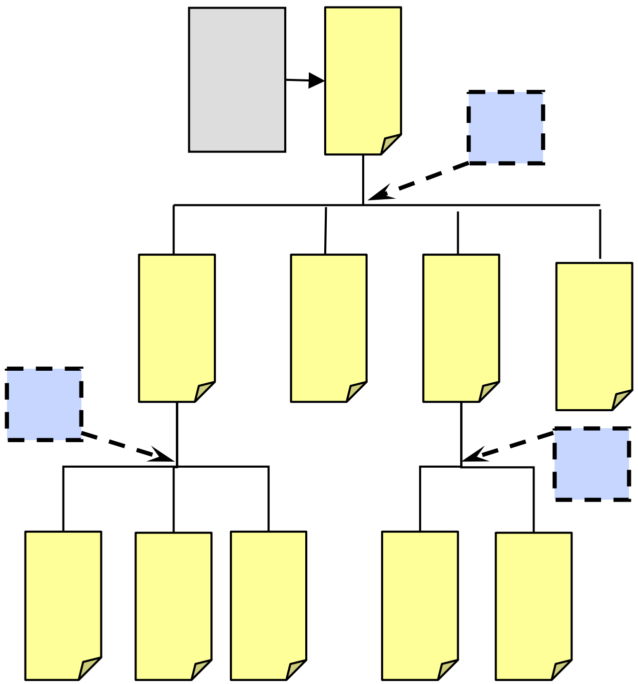




Role	Number	SCE
Prevention	P-01	Structural integrity hull
	P-02	Structural integrity topside
	P-03	Hydrocarbon containment topside and turret
	P-04	Hydrocarbon containment hull
	P-05	Hydrocarbon containment risers, pipelines and subsea facilities
	P-06	STP buoy and mooring system
	P-07	Green sea protection
	P-08	Inert gas, vapour recovery and purge gas systems
	P-09	Collision prevention and navigation aid (marine and aviation)
	P-10	Lifting appliances and dropped object protection
	P-11	Wells and well intervention (COMOPS only)

	Number	SCE
Detection	D-01	Fire and gas detection system
Control	C-01	Ignition source control
	C-02	Emergency shutdown system
	C-03	Flare and blowdown
	C-04	Ballast systems
	C-05	Human machine interface and alarm management
	C-06	Subsea Safety Isolation Valves (SSIVs)
Mitigation	M-01	Open drains
	M-02	HVAC and natural ventilation
	M-03	Passive fire protection
	M-04	Layout and Explosion Mitigation
EER	ER-01	Temporary Refuge and muster
	ER-02	Escape routes
	ER-03	Lifeboats and embarkation areas
	ER-04	Offshore evacuation systems

Steps 3 & 4: Analyse Task & identify likely human failures.



Error Guidewords

- Planning Errors
- Action Errors
- Checking Errors
- Retrieval Errors
- Information / Communication Errors
- Selection Errors

Step 5: Identify factors that make failure more likely

HSE
Health and Safety Executive

Performance Influencing Factors (PIFs)

Performance Influencing Factors (PIFs) are the characteristics of the job, the individual and the organisation that influence human performance. Optimising PIFs will reduce the likelihood of all types of human failure.
NB. This list is not exhaustive

Job factors

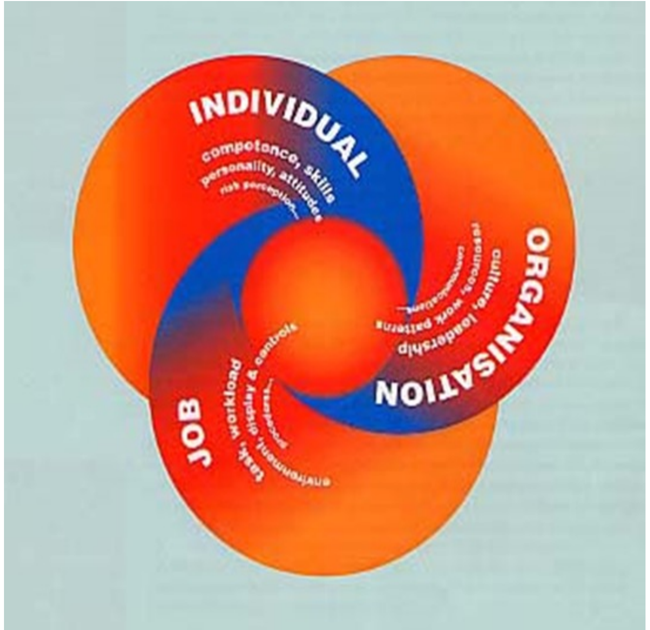
- Clarity of signs, signals, instructions and other information
- System/equipment interface (labelling, alarms, error avoidance/ tolerance)
- Difficulty/complexity of task
- Routine or unusual
- Divided attention
- Procedures inadequate or inappropriate
- Preparation for task (e.g. permits, risk assessments, checking)
- Time available/required
- Tools appropriate for task
- Communication, with colleagues, supervision, contractor, other
- Working environment (noise, heat, space, lighting, ventilation)

Person factors

- Physical capability and condition
- Fatigue (acute from temporary situation, or chronic)
- Stress/morale
- Work overload/underload
- Competence to deal with circumstances
- Motivation vs. other priorities

Organisation factors

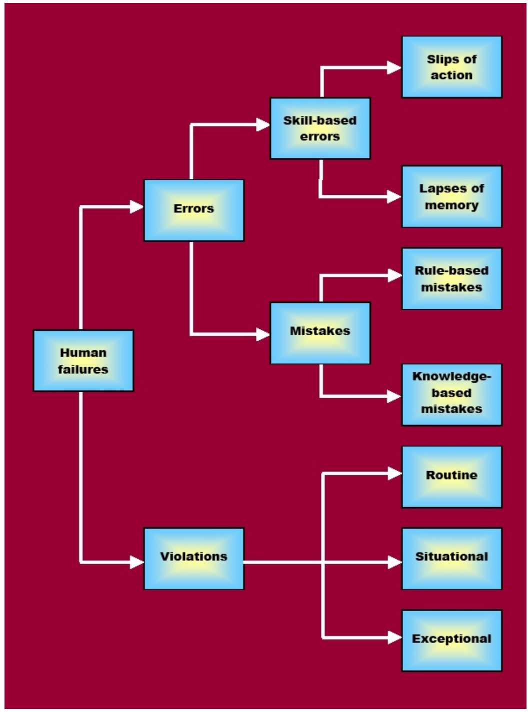
- Work pressures e.g. production vs. safety
- Level and nature of supervision / leadership
- Communication
- Manning levels
- Peer pressure
- Clarity of roles and responsibilities
- Consequences of failure to follow rules/procedures
- Effectiveness of organisational learning (learning from experiences)
- Organisational or safety culture, e.g. everyone breaks the rules



Step 6a: Implement appropriate risk management strategies

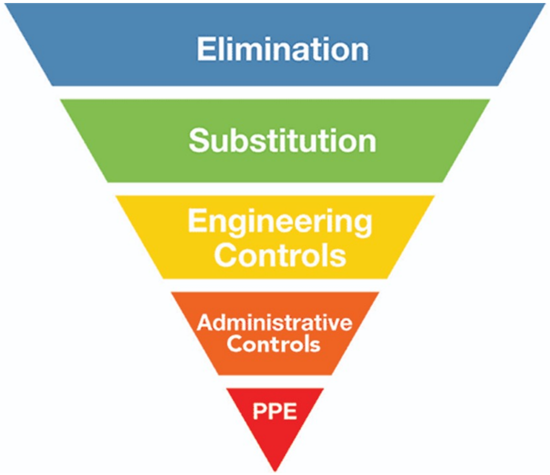
Skill-based errors (Slips/Lapses)

- Design changes (engineer out);
- Increase feedback to operators.



Mistakes (Rule/Knowledge)

- Technical & decision making training;
- Improved Procedures;
- Use of diagnostic aids;
- Team working which promotes problem solving.



Step 6b: Document findings

TASK GOAL: Responding to an Unconfirmed Gas Leak (in Turret), e.g. single gas detector being activated

Step	Description	Info.	Failure Mode	Consequences	RCMs	PIFs	Actions
1.0	PCRO Responds to incoming single alarm						
1.1	Gather information on gas detector alarm	Type of detector F or G, area, tag etc. Pop-up of STP Compartment on mimic. Kongsberg System evolution of system on	Information Retrieval Errors, e.g. R-4: Information retrieval incomplete. R-5: Information incorrectly interpreted.	Investigation team sent to wrong location – potential delay in diagnosis, response and recovery.	F&G panel HMI designed to relevant standards, e.g. EEMUA 201 and BS EN ISO 11064-part 5. Emergency response Simulator training for PCRO and Supervisor/Superintendent etc.	Weather conditions (roll and pitch) making it difficult for PCRO to gather information.	Are risks ALARP?
1.1.1	Establish area(s) affected						

What does good (SCTA) look like?

- Tasks selected vulnerable to error and have MA consequence (link to MAHs in Safety Case);
- Involved thorough de-composition of task;
- Models likely error forms;
- Realistic PIFs through physical verification;

Example 1: Bump Testing of F&G ‘Detection’ System

- Rig had methane and hydrogen sulphide gas detection.
- Use of near identical test gas cylinders to perform bump test.
- Potential to **poison** methane gas heads with H2S

What does good (SCTA) look like?

Example 2: EER- Evacuation

- Older ‘capsule’ style TEMPSC.
- Walk-through of task revealed latent error.

- Propeller/rudder oriented inbound to platform.

- Potential for platform strike.

What does good (SCTA) look like?

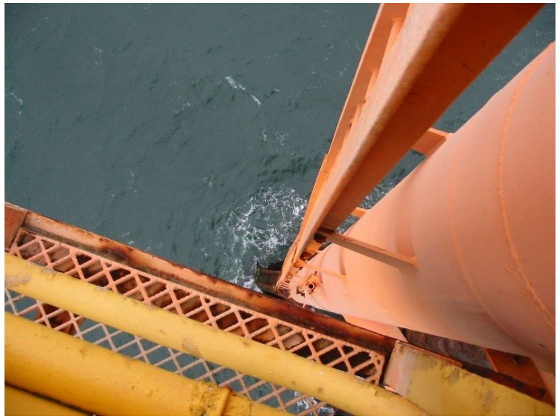
Example 3: EER- Means of Escape

- Use of life rafts to escape (if evacuation not possible)

- Escape via leg ladders

- Painter line detached - key component of escape system

- Escape to sea leg ladder terminates >4m short of sea surface



The bad & the ugly!

- Inappropriate tasks selected for analysis (no MA potential)

- Identified controls inappropriate or default towards the bottom of the hierarchy, e.g. training, awareness, procedures, PPE etc.

- Failure to decompose task sufficiently or desktop with no physical verification.

- Not involving right people (experience, competence) – including the analyst!

- **The ugly is giving recommendations which, if implemented, could, contribute to a MA sequence….**

Conclusions

- Overview of HSE Energy Division – Offshore
- HSE's preferred approach to making the demonstration that human contribution to risk is ALARP
- Examples of good, bad and ugly SCTA.
- Being used for decommissioning & dismantling activity as well material changes to accepted safety cases.

Thank you for listening.