«Maintaining Safe Operations»

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Agenda

- Why
  - Maintaining Safe Operations
  - Multi National Audit (MNA)
- Audit/Inspection Model
- Findings
- Learnings
- UK experiences
- Summary

WHY

HSE Impact of maintenance

Impact can happen, due to

1. Incidents that lead to an injury of the persons involved in performing the work

2. Errors or planning, execution or control of the work performed (erroneous execution of work)
3. Missing or delayed maintenance (work not done!)

Multi National Audit (MNA)

- Compare results
- Learn across boarder
- Network of experts
- Operators/duty holder are on both sides of the boarder
- Agreed model - common themes – local language / legislation
- Context
  - Platforms past design life – aging installations
  - Production platforms
  - Changes in ownership
  - Offshore facilities only

MNA Team

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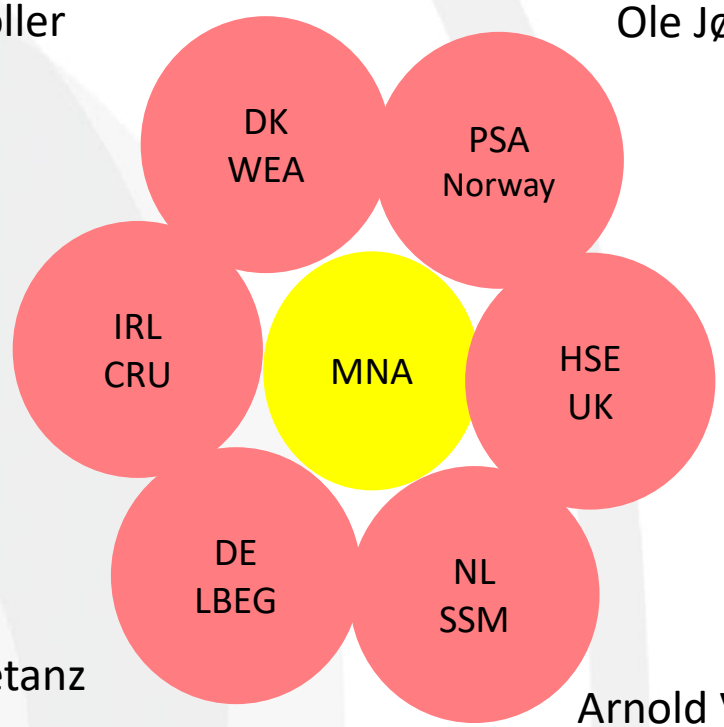

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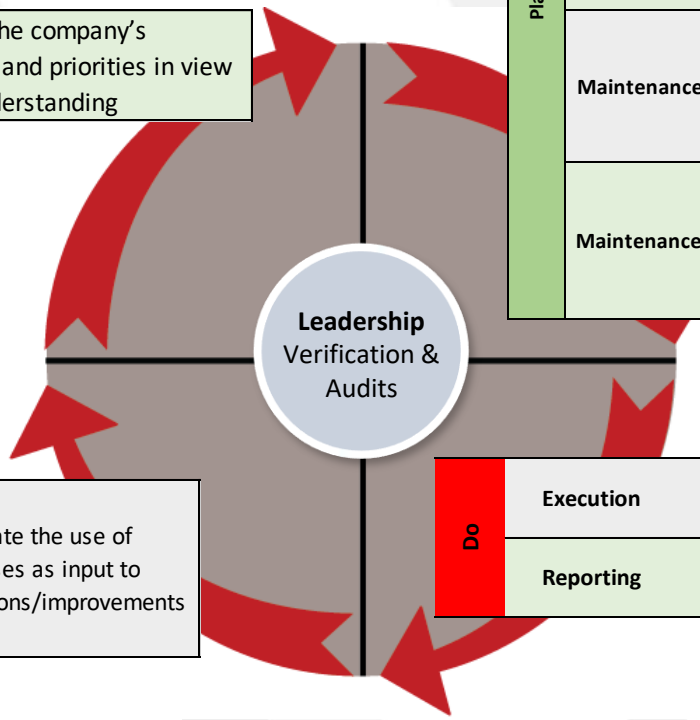
MNA MODEL

MNA Model

Act	**Improvements**	Evaluate the company's ambitions and priorities in view of risk understanding



Plan	**Strategies Goals & Requirements**	Evaluate the company's ambitions and priorities in view of risk and changes in context
	Resource management	Evaluate if it is sufficient balance between actual needs and Company's strategies, goals and requirements
	Maintenance Program	Evaluate the quality of the program in view of actual technical condition and total risk picture
	Maintenance planning	Evaluate the quality of the planning in view of the total risk picture

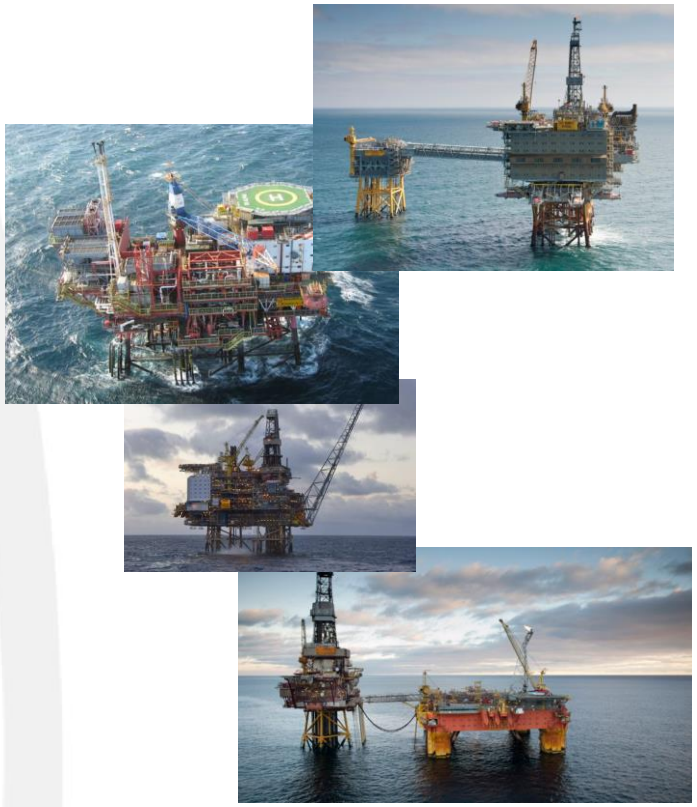
Check	**Analyses**	Evaluate the use of analyses as input to decisions/improvements

Do	**Execution**	Evaluate execution in view of risk understanding
	Reporting	Evaluate reporting routines in view of quality and technical condition

MNA – COMMON FINDINGS

Overall observations

- Leadership
- Cumulative Risk
- Maintenance Strategy
- Management System - CMMS
- Data Quality
- Quality control of maintenance tasks performed



Good practice

- Balancing strategies on safety and efficiency and cost
- Well-organized CMMS
- Periodic reviews - Management of Change (MOC) process.
- Focus on uptime and production reliability was confirmed
- Senior management involvement offshore decisions regarding maintenance. OIM and the workforce is also involved.
- Integrity of barriers (SECEs)
- Resource needs – overdue management

Poor practice

- Limited or no overall strategy for Maintenance Management
- Decisions at operational level
- Limited requirements for competence – key roles
- A high focus on uptime and production reliability - shutting down the facility may sometimes be safer option
- Quality issues in handling of deferrals of planned maintenance.
- Risk Management processes - severity level
- Operational Risk Assessments

Poor practice (cont.)

- Data Quality – CMMS
- Information not analysed in a systematic manner.
- Limited/no systematic checks of completed maintenance work
- Processes for monitoring/auditing/reviewing/investigating their own processes
- Management of redundant or decommissioned equipment

MNA learnings

Issues for follow-up by the industry:

- Process Safety Leadership.
- Use of internal audits to assess the precision and quality of data in the CMMS
- Guidance on quality assurance, supervision and sample checking of the correct execution of safety critical maintenance.
- Temporary repair methods, impact on system and installation integrity and risk

The authorities:

- Time with CEO and/or top management
- Joint set of question sets - guidance and consistency
- Onshore support team - more important as more of planning and system work is performed onshore
- Advance documentation before audits
- Offshore, the time with key roles
- Resource demanding audits
- How to get the Operator/ Duty Holder , to identify their own challenges?

Maintaining Safe Operations
Leadership Audits

EXPERIENCES FROM THE UK

Dave Walker: HSE Energy Division Operational Policy Team Lead (HM Principal Inspector of Health & Safety)

Maintaining Safe Operations Leadership Audits

Dave Walker: HSE Energy Division Operational Policy Team Lead (HM Principal Inspector of Health & Safety)

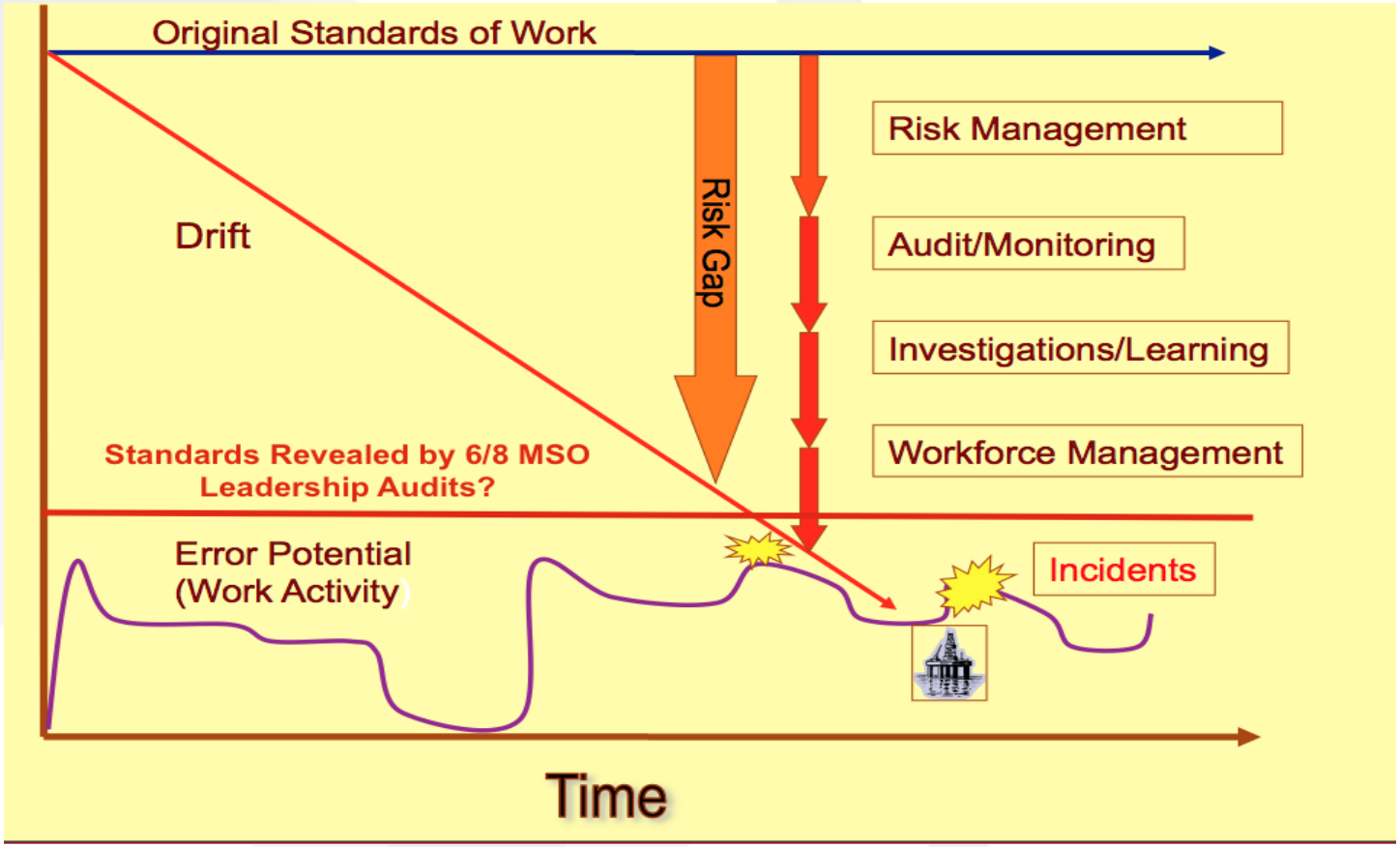
MSO Aims – Focus on Leadership

- We wanted to:
  - Develop an understanding of the measures, processes & procedures Duty Holders employ to deliver sustainable asset integrity
  - Test their capability to manage Major Accident Hazards, given the challenging economic climate (“lower for longer”)
  - See the clear ‘line of sight’ from boardroom decisions to the impact on operations at the sampled offshore installation
  - See effective operational feedback with the right metrics & ‘dashboards’ in place

MSO Template & Inspection Guide Scores: Capability issues & implications for Hydrocarbon Release performance etc

Onshore MSO Template	A	B	C	D	E	F	G	H
Maintenance Basics	30 (BC)		Template	30	40	TNS	TNS	TNS
Organisational Arrangements	30		Not	40 (poor)	40			
Competence & Maintenance Personnel	30		Scored	30	40			
Maintenance Execution	30			30	30			
Recording completed maintenance	30			40	40			
Backlogs	30			40	40			
Deferrals	30			30	40			
ORAs	30			40	40			
Maintenance Monitoring, audit & review	30			40	40			
Verification Basics	30			40	30			
Verification Monitoring, Audit & Review	30			40	40			
Control of Work	30			50 (VP)	40			
Offshore MSO Template	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Maintenance arrangements	30	20 (FC)	Template	30	40	TNS	TNS	TNS
SCE Maintenance	30	30	Not	40	40			
Supervision	30	30	Scored	40	40			
Records	30	30		40	30			
Backlog	30	30		30	20 (FC)			
Deferrals	30	30		40	40			
Corrective Maintenance	30	30		40	40			
Measuring Maintenance Effectiveness	30	20		30	40			
Measuring Quality of Maintenance Work	30	20		40	40			
Verification	30	30		40	30			
ICP's Recommendations	30	30		40	30			
Control of Work	30	NI		50	40			
Inspection Guide Scores	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Control of Work			40		40	40		40
Loss of Containment		30	30	40	40	40	40	40
Maintenance Management	30	30	40	30	40	40	40	40
Operational Risk Assessments	20			40	40	40	40	
SECE Management & Verification		30			40		40	40
Temporary Refuge Integrity		30						

MSOLA looked for “downturn drift”, but found long-term, systemic weakness in key risk control barriers



Leadership inspections (1)

- Duty Holders were largely addressing the lower oil price by making efficiency and cost savings without significant cuts to either manpower or operational budgets.
- Most DHs were clear that front line maintenance and associated operations have not been cut in any significant way.
- In some cases front line spending had increased.
- HSE IDMSO Inspections were required to confirm or challenge the effectiveness of these approaches as experienced on the front-line.

Leadership inspections (2)

- A number of Duty Holders are having difficulty reaching levels of safety management that are worthy of maintaining, at least in some key safety management system areas

- There are weaknesses in some Duty Holder's communications
  - to ensure that their messages flow down their organisation
  - are implemented effectively, and
  - in the flow of good and bad news back up to the leadership (**audit, monitoring, KPIs, effective offshore management visits**, etc).

- Some Duty Holders scored "poor" in a range of the key HSE Inspection Guide subjects. **The failings were fundamental and often appear to be systemic and long lived.**

Leadership inspections (3)

- A number of DHs recognise at least some of their weaknesses in these areas and are attempting to address them.

  - However, there is also a clear need for HSE to help DHs define and articulate what good looks like.

- A number of the DHs recognise that an effective **culture** is central to improving and maintaining standards and they are working hard to improve.

  - However, relative to plant and processes and other people issues, culture can be difficult to define and measure and it is clear that DHs struggle with it. HSE could be doing more to help the industry address this issue.

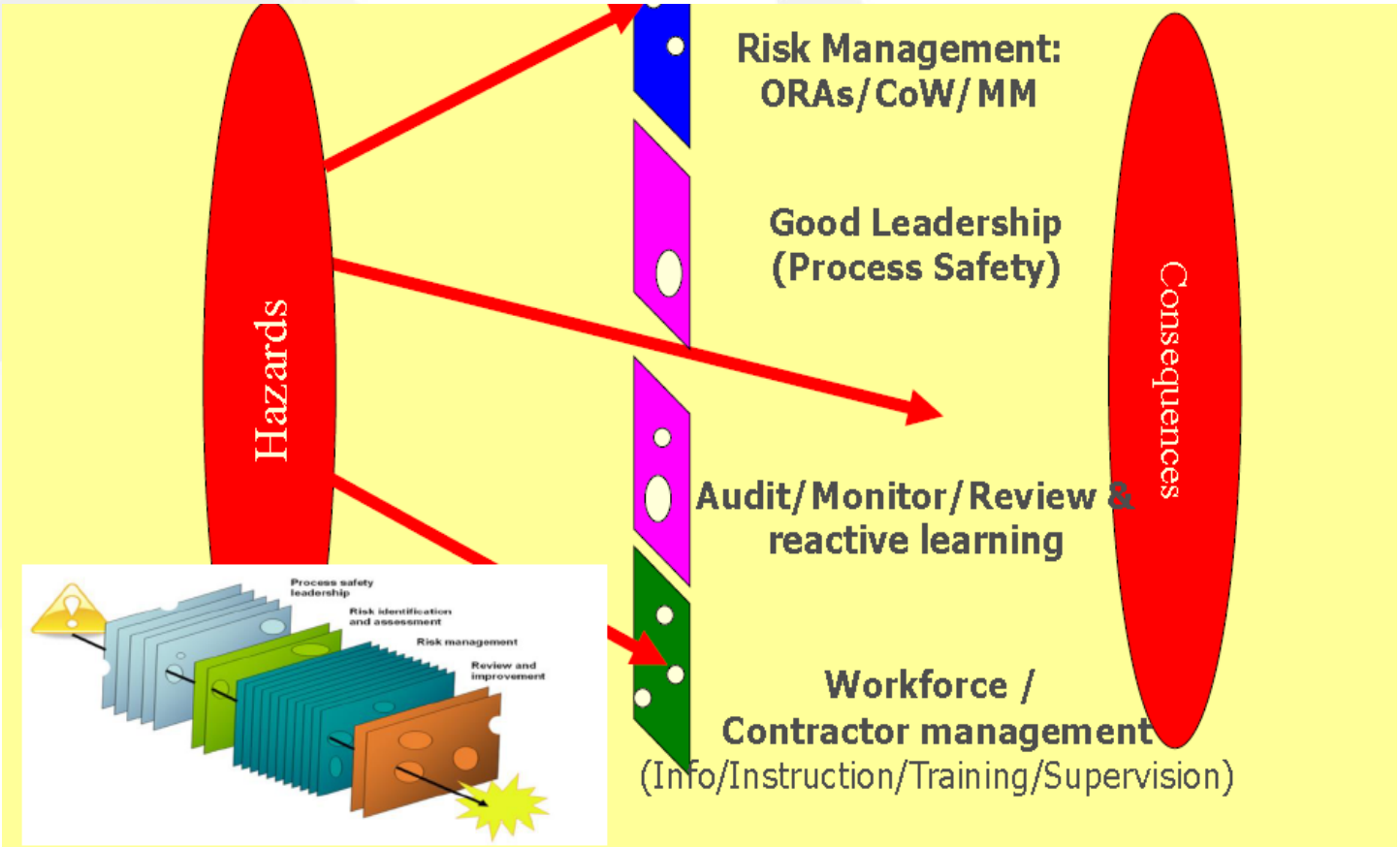
SMS & Technical Deficiency (1)

- **Failure to undertake effective monitoring, audit and review** of a range of key risk control systems relating to hardware and/or procedures etc and including maintenance and verification systems. How do leaders know they have safe operations?
- **Risk Assessment** for Control of Work etc: Risk Controls LTA / Can't stop job if you don't know when to
- **Operational Risk Assessments** (ORAs, Deviations etc):
  - Inadequate procedures, risk assessments & controls insufficient or not applied.
  - Ineffective or no consideration of cumulative effects.
  - Difference in standards and competency between ORAs for wells and other plant and equipment
- **Inadequate provision of information, instruction, training & supervision** for a range of risk control systems and roles such as Elected Safety Representatives
- **Contractor Management:** Some expect DHs to provide Process Safety Management training
- **Investigation and Learning:** Duty Holders can usually avoid repeating same incident, but don't focus on their underlying Safety Management weaknesses that will cause different incidents

SMS & Technical Deficiency (2)

- Failures to demonstrate the effective management of structural integrity
- Failure to update P&IDs
- **Operating Procedures unsuitable** and not produced using Safety Critical Task Analysis principles
- **Inability to demonstrate competence for technical roles**, sometimes at up to technical authority role. Some Technical Authority resources appeared stretched, but demand increasing.
- **Ineffective management of small bore tubing**
- Failure to review written schemes of examination for **Risk Based Inspection** schemes
- Maintenance management databases not being correctly populated and/or updated
- **Control of Work** (Permit to work) failings, including risk assessments/risk controls that are not suitable and sufficient and/or failure to follow own Permit procedures. Permits populated by trivia
- **Maintenance procedures not sufficient** to control the risk of HCRs and other incidents that could foreseeably arise from maintenance. Inadequate identification of safety critical tasks
- **Deferrals**: inadequate risk assessments most common failing, but at least one DH had a deferrals process that was not fit for purpose and another didn't have a functioning process.

Why findings on key barriers should cause unease for all



Balanced Feedback?
SWOT Analysis from the pilot inspection

Relative Strengths	Relative Weaknesses
• Flat Management Structure – easier to have good line of sight • Logical structured approach to cost reduction • Safety Representative portal – good source of information • Key contractors work in same building • Handled recent INs maturely and got a lot of buy in from employees • Safety Critical maintenance planning, looking for opportunities and potential threats to the schedule. • Implementation of new procedures taking in to account SCTA. • In-house CRO training for new project equipment. • Management of DH personnel competency via their CPP folders. • RBMI system • Plans for better integration of existing databases • Trialling new inspection techniques for technically challenging areas • Safety Critical maintenance planning, looking for opportunities and potential threats to the schedule. • Open learning attitude	• Small management team so a risk to continuity if key players were unavailable (Integrity Manager and Maintenance and Reliability Manager). • Maintenance Instructions not up to same SCT standards of Production procedures • Suitability/comprehensiveness of written instructions and results recording associated with safety critical element maintenance. • Wells SCT deferrals have poor risk assessment • Lack of contingency planning for Wells incidents • High volume of inspection and remedial work as a legacy of the previous, weak structural inspection programme. • Redundant equipment taking up inspection resource that could be better deployed • Risk perception associated with safety critical maintenance deferrals. • Contingency planning in the event of a task going wrong. • Potential network gaps (small organisation) • Compliance rather than effectiveness and compliance verification
Potential Opportunities	**Potential Threats**
• Safety Representatives engaged in MAH prevention and keen to do more. • Use ICP more to validate design and inspection planning. • Delta V simulator for project to improve process understanding , troubleshoot problems and optimise operations project allowing baselining of new vessels and pipework in process stream • Removal of redundant equipment post-project will reduce costs and simplify plant layout • Re-vamp area inspections to bring in OIEs from other installations, safety reps or other non-inspection personnel to have a 'fresh eyes' approach • Use of verifiers 'fresh eyes' on what is safety critical – focus on what is important and improve holistic understanding • Use of interaction of TAs and offshore personnel to improve operational understanding designed to enhance resilience – consistent with a systems approach to aging assets.	• A lot of Legacy activities plus new Activities – how will the small team / limited financial resources achieve what is needed • Wells Team appear not fully integrated with rest of business for Risk Management • Lack of complete line lists creating 'known unknowns' e.g. insulated lines • Subsea inspection history and unknowns due to incomplete inspections • Management of small bore tubing across the installation prior to an inspection campaign being carried out to assess the condition. (Also open ends on systems) • Sand Management associated with the second stage separation units introducing increased risks to personnel. • Concentrate on learning from others (with a similar approach) without looking at the wider lessons - e.g. barrier approach and resilience.

Sustained Capability through Leadership

IDMSO Findings: Typically >10 significant issues	Front Line Issues	Barrier Failures: Addressing symptoms not sustainable solution
Poor procedures; Following procedures; Lack of resources; Lack of time; Poor risk perception….	Immediate Underlying Causes	Identification of aspects of people, processes and plant which link to the barrier failures
Audit, monitoring and review ineffective; Risk management; Workforce management; Learning and SEMS review	SMS Failures	Identification of key aspects of SMS not working effectively, needing change or improvement
Lack of focus; Lack of time; Lack of perception; Lack of information; Ineffective systems	Failure to Lead	Identify problems then make changes at level where they most effective

What's next for the Regulator & Industry?

For HSE: Continue with ID MSO Leadership Audits (4 in 18-19)

- Issue HCR challenge to Industry: Letter to leaders from Chris Flint which focusing on Operational Integrity capability & performance (**HCR Letter sent 26 April 2018**)
- Incorporate learnings and methods from both MSO & OI into:
  - Inspections programme and Development of next phase of intervention strategy
- Release of Step Change HCR Reduction Toolkit and LoC IG on 8 March.
- Repeat of these messages at Safety 30 Conference

For you: Reflect and act on the links between front line safety issues and leadership characteristics

- Are you right to be confident in your arrangements for monitoring/audit/review; instruction/training/supervision & risk management?
- You know your installations and systems better than we ever can. How do you demonstrate to us that you are aware of your barrier failures or weaknesses at all levels and are addressing these?

SUMMARY

Summary

- HSE Impact of maintenance
- Risk Management
- Integrity of barriers
- Leadership

Pictures: Offshorepost.com and Wikipedia.org

www.ptil.no
www.hse.org.uk