

# Assessing Non-Technical Skills (NTS) utilising team Behavioural Markers in Simulation Based Exercises (SBE)

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# Agenda

- Crew Resource Management (CRM)
- 6 Non-Technical Skill (NTS) Competencies
  - Benefits of CRM Training & Return on Investment (ROI)
- Similarities between Aviation, Healthcare & Well Operation Environments
- Simulation Based Exercise (SBE) Principles
- Behavioural Markers in Aviation, Healthcare & Well Ops
- Evaluation of research on SBE in Well Operations
- Conclusion

Approximately  
80% of accidents can be  
attributable to a human  
contribution of some sort

# WOCRM Update - IOGP Reports



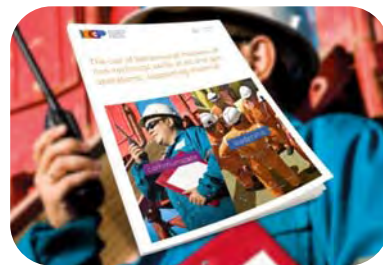
476



501



502



503



509

## Crew Resource Management (CRM)

- **Crew Resource Management** involves enhancing team members' understanding of human performance, specifically the social and cognitive aspects of effective teamwork and good decision making.
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## 6 Non-Technical Skills of CRM

- Non-Technical skills are of two distinct types
  - Cognitive skills
  - Social skills



# Distinctive Features of CRM



Source: Musson, D. M., & Helmreich, R. L. (2004). Team training and resource management in health care: current issues and future directions. *Harvard Health Policy Review*, 5(1), 25-35

# Benefits of CRM Training

**Enhanced Safety**

**Reduced Costs**


**Increased Productivity**

**Process Optimisation**

**Reduction in Lost Time  
Incidents (LTI's)**



# Empirical Support of CRM



Scientific  
Evidence



Endorsed by  
NASA, CASA,  
QLD Rail, QLD  
Mines &  
Energy, NSW  
Planning &  
Environment



Tested & applied  
in a range of  
safety critical  
industries

# Return on Investment (ROI)

- Over 3 years, 3000 employees were trained, costing USD3.6million
- Total # of adverse events avoided was 735
  - **25.7%** reduction in events
  - Overall ROI was in the range of USD9.1 to USD24.4million
- CRM is a financially viable way to avoid incidents that ultimately hurt the bottom line

Article

— AMERICAN COLLEGE OF —  
MedicalQuality

## What Is the Return on Investment for Implementation of a Crew Resource Management Program at an Academic Medical Center?

American Journal of Medical Quality  
2017, Vol. 32(1) 5-11  
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sagepub.com/journalsPermissions.nav  
DOI: 10.1177/1062860615608938  
journals.sagepub.com/home/ajmq  
SAGE

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### Abstract

Crew Resource Management (CRM) training has been used successfully within hospital units to improve quality and safety. This article presents a description of a health system-wide implementation of CRM focusing on the return on investment (ROI). The costs included training, programmatic fixed costs, time away from work, and leadership time. Cost savings were calculated based on the reduction in avoidable adverse events and cost estimates from the literature. Between July 2010 and July 2013, roughly 3000 health system employees across 12 areas were trained, costing \$3.6 million. The total number of adverse events avoided was 735—a 25.7% reduction in observed relative to expected events. Savings ranged from a conservative estimate of \$12.6 million to as much as \$28.0 million. Therefore, the overall ROI for CRM training was in the range of \$9.1 to \$24.4 million. CRM presents a financially viable way to systematically organize for quality improvement.

### Keywords

patient safety, crew resource management, quality improvement, medical errors, organizational change

# Similarities in High Risk Environments



Aviation



Healthcare



Well Operations

# Simulation Based Exercise (SBE) Principles

- Develop learning objectives and expected performance standards
- Train the team as a whole
- Use a **Behavioural Marker** framework
- Provide feedback during a structured debrief
- Repeat simulator-based training regularly to enhance expertise and retain performance standards

# Behavioural Markers - Flight crew (LOSA)

Execution Behavioral Markers			Rating
<b>MONITOR / CROSS-CHECK</b>	Crew members actively monitored and cross-checked systems and other crew members	— Aircraft position, settings, and crew actions were verified	1
<b>WORKLOAD MANAGEMENT</b>	Operational tasks were prioritized and properly managed to handle primary flight duties	— Avoided task fixation — Did not allow work overload	2
<b>VIGILANCE</b>	Crew members remained alert of the environment and position of the aircraft	— Crew members maintained situational awareness	3
<b>AUTOMATION MANAGEMENT</b>	Automation was properly managed to balance situational and/or workload requirements	— Automation setup was briefed to other members — Effective recovery techniques from automation anomalies	

Rating Label	Description
4 – Good	Performance was of a consistently high standard, enhancing patient safety; it could be used as a positive example for others
3 – Acceptable	Performance was of a satisfactory standard but could be improved
2 – Marginal	Performance indicated cause for concern, considerable improvement is needed
1 – Poor	Performance endangered or potentially endangered patient safety, serious remediation is required
N/A – Not Applicable	Skill was not required or relevant in this case

# Behavioural Markers – Surgery Teams (NOTSS)

Category	Category rating*	Element	Element rating*	Feedback on performance and debriefing notes
Situation Awareness		Gathering information		
		Understanding information		
		Projecting and anticipating future state		

Rating Label	Description
4 – Good	Performance was of a consistently high standard, enhancing patient safety; it could be used as a positive example for others
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# Behavioural Markers – Well Operations

## Training Objective:

To maintain awareness of the big picture (avoid risk of tunnel vision) and the risk of confirmation bias.

Non-technical skills: Situation Awareness / Decision Making			Training objective: Awareness of tunnel vision and confirmation bias		
Behaviours reflecting good practice	Observations	Notes	Behaviours reflecting poor practice	Observations	Notes
Regularly checks key sources of information including alarms and other prompts	✓✓✓	<i>FREQUENTLY CHECKED WITH THE CONTROL ROOM FOR UPDATE. ENSURED ASSISTANT REGULARLY CHECKED PRESSURE DATA.</i>	Waits for the alarms as the prompt to intervene in an activity or to carry out checks	✓✓✓	<i>DIDN'T NOTICE THE DEVELOPING PROBLEM WITH THE MUD SYSTEM UNTIL THE ALARM WENT OFF.</i>
Makes time to attend to anyone who offers potentially relevant information	✓✓	<i>TOOK TIME TO READ THE EMAILS FROM THE LAB.</i>	Does not give sufficient attention to information from unexpected sources or from more junior team members	✓	<i>DECLINED TO TAKE THE PHONE CALL FROM SHORE - ASKED THEM TO CALL BACK AT THE END OF THE SHIFT.</i>
Challenges assessments of risk and the state of the world			Does not evaluate the reliability of information which has potential to create an unsafe condition	✓	<i>TOLD JOHN THAT THE PRESSURE GAUGE GIVING AN UNEXPECTED HIGH PRESSURE WAS KNOWN TO BE FAULTY.</i>

# Behavioural Markers – Well Operations

Non-technical skills: Situation Awareness / Decision Making			Training objective: Awareness of tunnel vision and confirmation bias		
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Result	Assessment
Observations predominantly reflect good practice: few poor practices observed.	Individual demonstrated satisfactory performance of the skill.
Observations balanced, or predominantly reflect poor practice.	Trainee did not demonstrate satisfactory performance of the skill. Further training would be beneficial to improve awareness of behaviours that can lead to loss of situation awareness.
Observations predominantly reflect poor practice. Few good practices observed.	Trainee did not demonstrate satisfactory performance of the skill. Further training needed to improve awareness of behaviours that support good situation awareness, as well as behaviours that can lead to loss of situation awareness.



## Simulator Based Exercises in Well Operations

- 5 training courses of 25 simulator exercises assessed
  - Behavioural markers provided a structure for debriefing team performance after each exercise
    - Coaching and prompting of expected behaviours seen within the team during later exercises
- SBE success depends on
  - Debrief quality by correct identification, review & reinforcement of effective behaviours

Source: Developing a team behavioural marker framework using observations of simulator-based exercises to improve team effectiveness: A drilling team case study Moffat & Crichton, 2015; Crichton et al., 2017

Investigating non-technical skills through team behavioral markers in oil and gas simulation-based exercises, Moffat & M Crichton, 2015

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## Conclusion

- CRM and Behavioural Markers are already being used in Aviation and Healthcare Industries with proven results
  - Although IWCF has created an introductory CRM course, using CRM and Behavioural Markers in every day operations and simulation training needs to become Industry Standard to see similar results
  - Easily done through implementing good quality debriefs that include Technical & Non-Technical aspects
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# Q&A





CREATED: 25 JULY 2018

## IWCF launches global crew resource management digital initiative

A new training initiative to help prevent oil and gas incidents by focusing on human behaviours has been launched free to industry by the International Well Control Forum (IWCF).

Experts in human factors and strategic leadership developed the online training course with IWCF, the independent, not-for-profit organisation which sets international training standards for well control.

Research findings for the creation of the Well Operations Crew Resource Management (WOCRM) awareness course show that better understanding of leadership, situational awareness and decision making can reduce the impact of human factors on major well incidents, such as Macondo.



### PROGRAMMES

[Level 1](#)[Online Programmes: Level 2](#)[Drilling Well Control](#)[Well Intervention Pressure Control](#)[SIGN UP FOR OUR EZINE](#)