Improving Situational Awareness Through the Design of Offshore Installations

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Introduction

Aim:

- Discuss the effect of modifications to offshore operations on Situational Awareness
- Identify measures applied within the design to improve Situational Awareness

Scope:

- Offshore installations
- Role of the Control Room Operator
- Actions within the design process

REDUCE risk. IMPROVE performance.
Presentation

- Aims and scope of paper & presentation.
- What is Situational Awareness?
- Why is Situational Awareness important in the offshore control room?
- How are modifications to design and operation of offshore environments effecting Situational Awareness?
- What are we doing to improve Situational Awareness in the design of offshore installations?
Situational Awareness is...

- Understanding what is happening and, given that information, what may happen in the future
- Essential to the decision making process
- Timely response is important to avoid:
  - Event escalation
  - System shutdown

“Operators who have lost SA may be slower to detect problems and require extra time to reorient themselves…and to proceed with problem diagnosis”

Endsley, Kiris (1995)
Contributors to SA

Situational Awareness

Components

- Perception
- Comprehension
- Projection

Contributors (examples)

- Availability of data
- Quality of information
- Mental model
Offshore Operations

- The offshore environment is inherently hazardous:
  - Blast
  - Fire
  - Noise, slips, trips & falls, etc.

- Mitigate hazards by reducing exposure:
  - More reliable equipment and increased automation reduces the time spent ‘on deck’ by outside operators
  - Introduction of remote control facilities removes personnel from the offshore facility altogether
Remote Control Room (RCR)

- Has the capability to perform control operations from offshore.
- Has some limitations (e.g., CCTV cannot yet be feasibly linked to RCR).
- Reduced sources of data/information?
RCR – Reduced Information?

- Control system (F&G system, Alarms, etc)
- Video conferencing
- CCTV
- Other CR Operators
- Remote Control Room Operator
- RADAR
- Outside operator comms (radio)
- Outside operator comms (F-2-F)
- Other control room equipment
Effect on Situational Awareness

- **Outside Operations:**
  - Reduced volume of information from outside operators. Reliance on HMI.

- **Remote Control Facilities:**
  - Reduction in information directly received from the environment.

- **Anecdotally these information sources are given a high regard by control room operators.**

“In many complex systems…much of Level 1 SA (perception) comes from the individual directly perceiving the environment. Communications with others form an additional information source”

Endsley (2003)
Contributors to SA

Components

Perception
Comprehension
Projection

Contributors
(examples)

Availability of data
Quality of information
Mental model

Situational Awareness
Mitigation: General Design

General Design Considerations:

- Inclusion of end user within the design process
- Timely inclusion of Human Factors within the design process
Mitigation: Human Machine Interface

Human Machine Interface:

- Support the mental model - representation in the control system is consistent with the mental model

- Quality over quantity:
  - Display necessary information only (note the dangers of automating this decision - end user input is required)
  - Prioritize and filter alarms during design
  - Suppress unnecessary alarms

- Multifunctional systems allow for more effective prioritization
Mitigation: Control Room Design

Control Room Design:

- Limit distractions to control room operators
- Facilitate essential operations and communications
- Provide supplementary equipment if justified (e.g., additional monitors for trending)
- Keep up-to-date with technological advances in communication systems (e.g., video-conferencing)
Mitigation: Job Design

Job Design:

- Training and experience to maintain mental model
- Onshore/offshore job rotation
Summary

- Situational Awareness is important for timely and accurate decision making
- Initiatives to reduce exposure to hazards may negatively effect situational awareness
- These effects can be mitigated by improving the level of Situational Awareness by:
  - Engaging the end user in the design process
  - Consideration of Human Factors and Situational Awareness within the design
  - Improving the mental model through job design and training
Thank you.