

When no one is truly accountable for energy optimization

.....What do we do?
Situation awareness in energy optimisation



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Journal of Cleaner Production 171 (2018) 175–183

Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

Review

Energy-efficient operational training in a ship bridge simulator

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ARTICLE INFO

Article history:
Received 30 May 2017
Received in revised form 6 September 2017
Accepted 3 October 2017
Available online 4 October 2017

Handling Editor: Cecilia Maria Vilas Biaz de Alameda

Keywords:
Shipping
Maritime education
STCW
Energy efficiency
Awareness
Simulator training

ABSTRACT

Over the recent decades, there has been an increasing focus on energy-efficient operation of vessels. It has become part of the political agenda, where regulation is the main driver, but the maritime industry itself has also been driven towards more energy-efficient operation of the vessels, due to increasing fuel costs. Improving the energy efficiency on board vessels is not only a technical issue – factors such as awareness of the problem, knowledge skills and motivation are also important parameters that must be considered.

The paper shows how training in energy-efficient operation and awareness can affect the energy consumption of vessels. The study is based on navigational, full-mission simulator tests conducted at the International Maritime Academy SIMAC. A full-mission simulator is an image of the world allowing the students to obtain skills through learning-by-doing in a safe environment. Human factors and technical issues were included and the test sessions consisted of a combination of practical simulator exercises and reflection workshops.

The result of the simulator tests showed that a combination of installing technical equipment and raising awareness – making room for reflection-on and in-action – has a positive effect on energy consumption. The participants, on average, saved approximately 30% in fuel.

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Energy Research & Social Science 44 (2018) 50–66

Contents lists available at ScienceDirect

Energy Research & Social Science

journal homepage: www.elsevier.com/locate/erss

Original research article

Energy efficiency at sea: Knowledge, communication, and situational awareness at offshore oil supply and wind turbine vessels

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ARTICLE INFO

Keywords:
Shipping
Energy efficiency
Situational awareness
Human factor

ABSTRACT

The increasing focus on energy-efficient operation of vessels can be seen in both legislation and research. This paper focuses attention on the human factor influencing energy efficiency and explores the conditions for improving energy efficiency in working vessels taking situational awareness (SA) theory into consideration.

The study builds on two cases: an offshore supply vessel for the oil & gas industry and an installation vessel for wind turbines. The study used qualitative methods based on 49 interviews with seafarers and onshore employees from the vessels and shipping companies.

The study has identified that the energy efficiency of a ship is mainly influenced by legislation and the practice formed on board. The results showed that the theory on SA is very useful in explaining the factors affecting the energy efficiency of a vessel and the practice.

The study has shown that obtaining a more energy efficient operation is complex and depends not only on the officer on board the ship. The improvement of energy efficiency is possible, but there is a need to understand the complexity of the issue and to involve both the crew and the entire system around the ship, and to obtain a shared perspective of energy efficient operation. Furthermore, in order to improve energy efficiency in shipping companies, there is a need to support the seafarers in gaining more skills for operating the ship more energy efficiently; to do this the right way there is a need to create an understanding of the system by the authorities, ship owners and charterers.

Method and Data

Data used for the present study includes a wide range of qualitative data - documentary data, interviews, workshops and observations on board the vessels.

A total of 77 interviews were conducted in the period September 2015 - January 2016

- In company A
 - Office: 4 interviews with representatives from both the technical and HSQE departments
 - Ship: 20 interviews with the crew on board the ship when it was in the harbor
- In company B
 - Office: 4 interviews with representatives from both the technical and HSQE departments
 - Ship: 21 interviews with the crew on board the ship in the harbor and during 5 days of fieldwork at sea
- In company C
 - Office: 2 interviews with technical and management departments
 - Ship: 26 interviews with the crew on board the ship during sea voyage



Specific company information, including policies (especially environmental policies), operational guidelines and procedures from the Safety Management System (SMS) and other internal documents, including internal webpages, HSQE programs, etc., were studied. The content of the ship energy efficiency management plan (SEEMP), together with the use of the plan, was examined in detail.

Results

Perception:

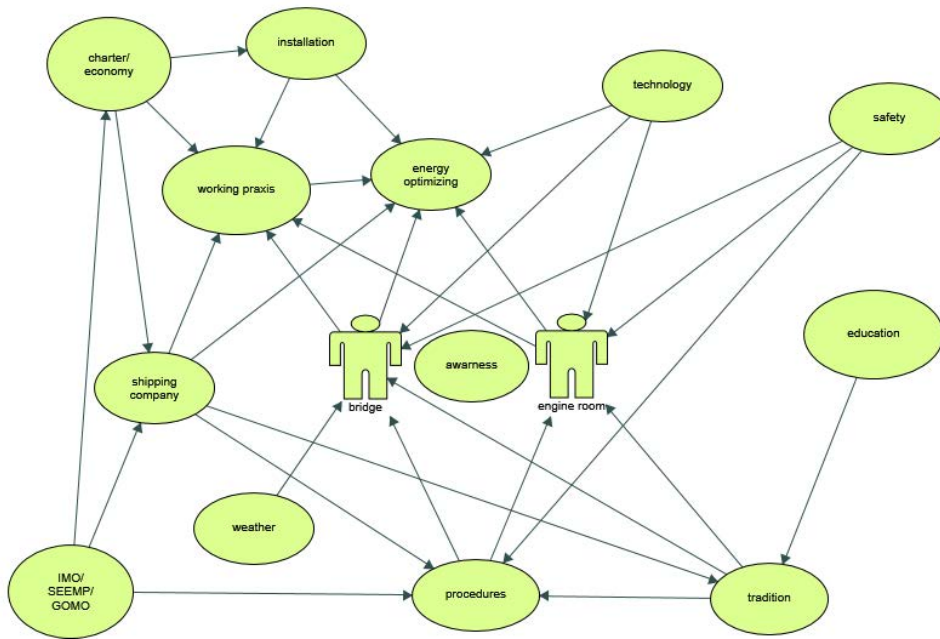
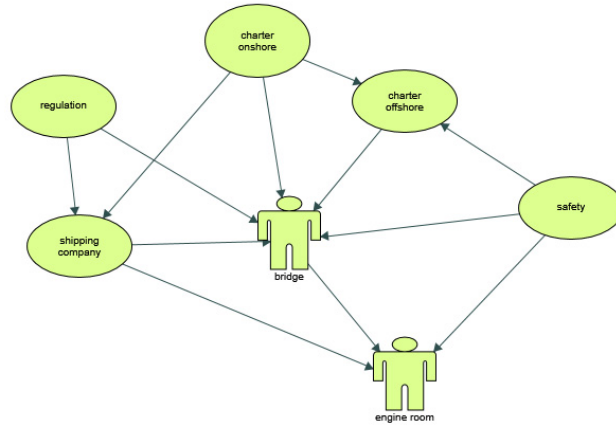
- Shipping company – Crew
- Shipping company – Charter
- Bridge – Engine room

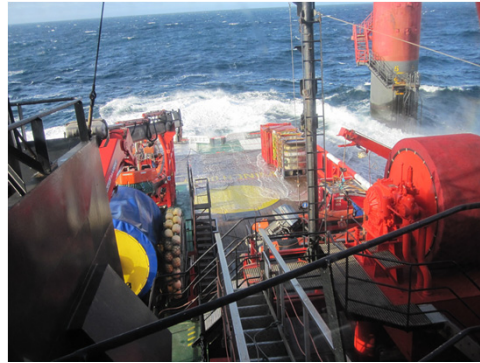
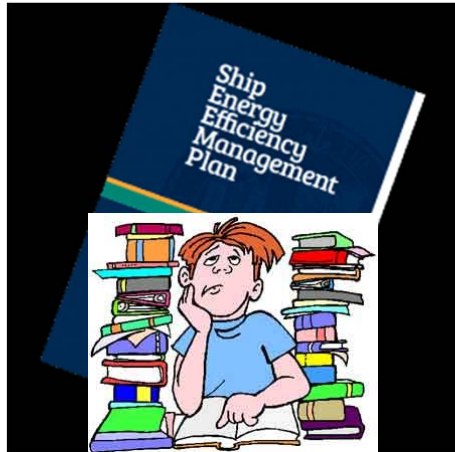
Challenges:

- Contract
- Economy
- Time
- Safety
- Praxis - an ancient Greek word meaning the way of “doing”



Hierarchy





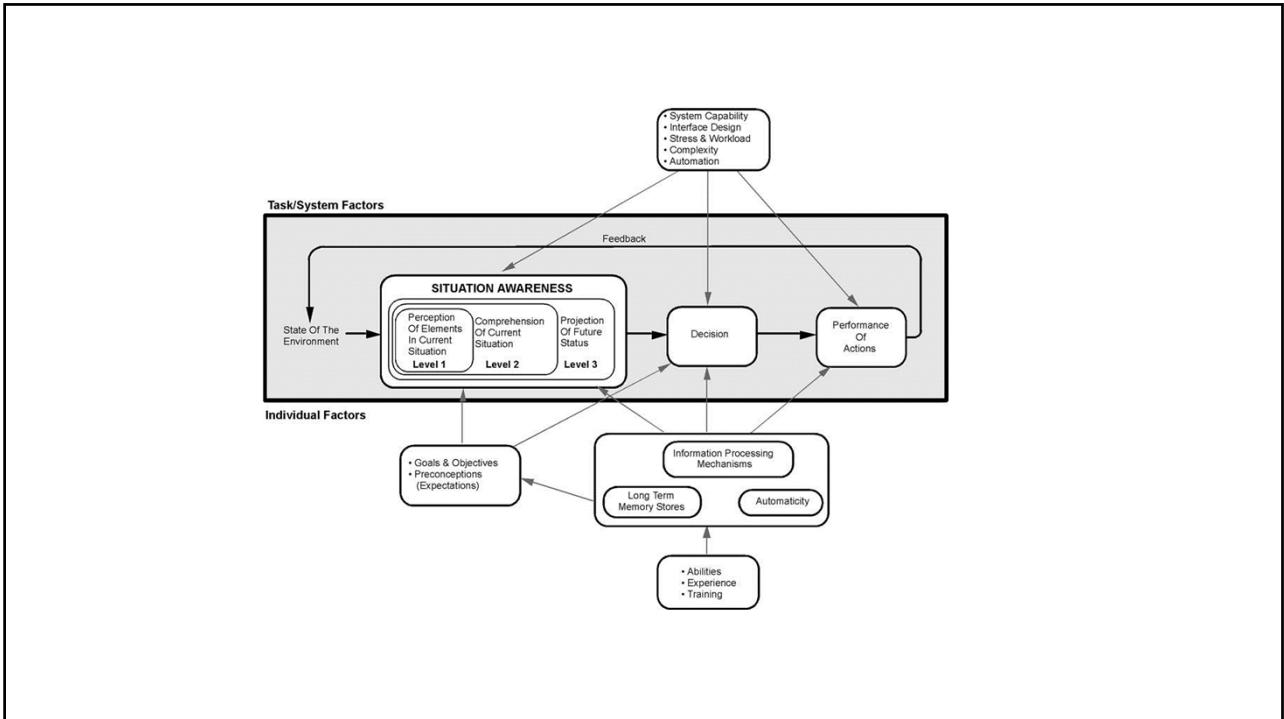
Because we have experienced so many outage over time, we do not really trust anything. I can easily explain why I ran aground if all my engines had been running and failed than I would if some had just been started i.e. not all were running. (office bridge)

We are obliged by the customer who specifies that we sail at 8 knots, and if we don't, (...) they say we could have arrived earlier and we incur a fine (bridge officer).

- ... I don't think it's a very active document for us; so you might say that it's a bit of decoration. (Office)
- I think I can say yes to that. I often know that there is a lot of documentation on the ships (...), but at that time (...) a general requirement (IMO regulation) was issued that there should be an SEEMP (...) we clearly reported that (...) there is an action plan in it. (...), We wrote (to the ships) that it should not be left on the shelf. (Office)

Situation awareness

“Situation awareness is the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future” (Endsley 1995, p. 36)

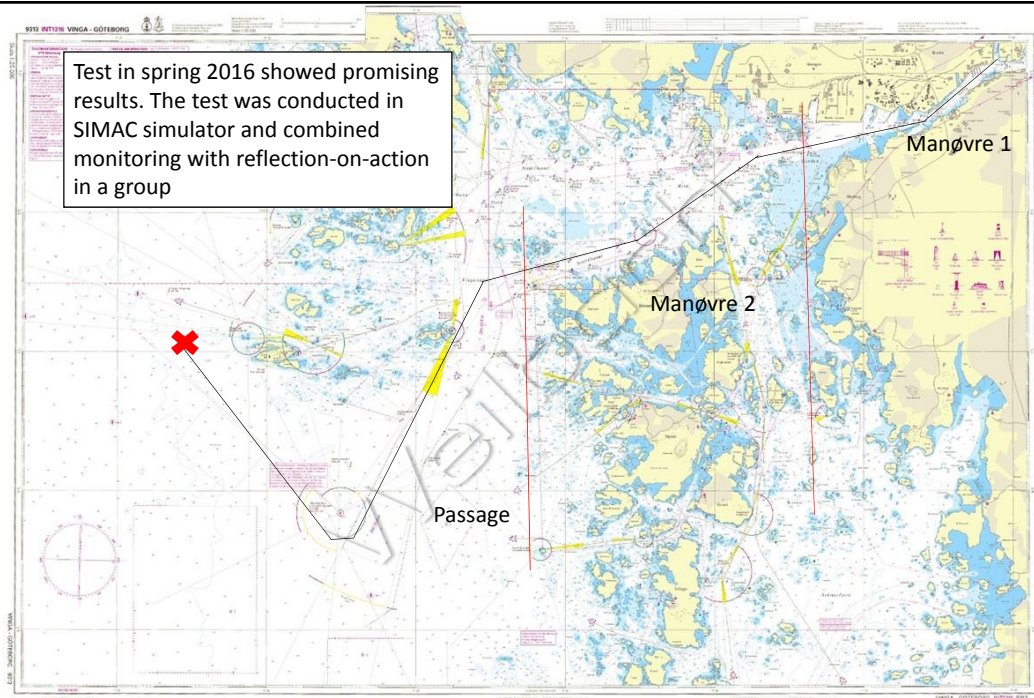


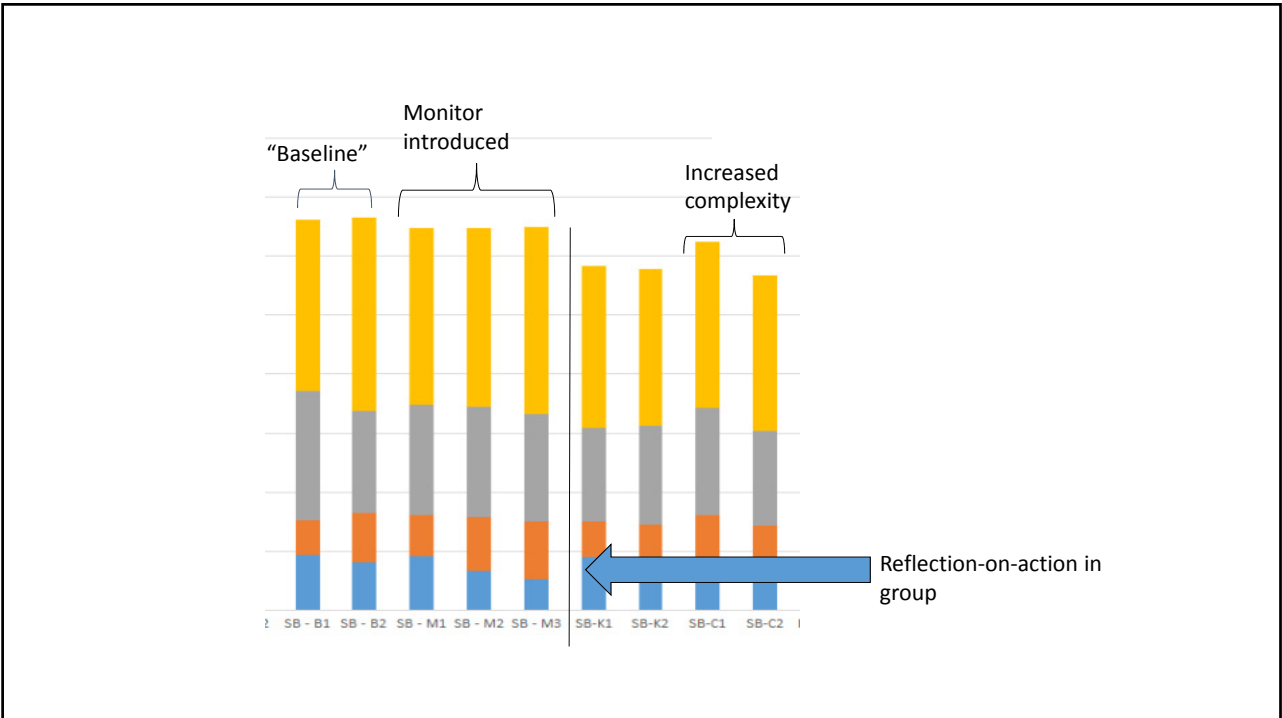
Challenges

- Language on Energy Efficiency
- Comfort zone
- Flexibility
- Perspective
- Responsibility



Test in spring 2016 showed promising results. The test was conducted in SIMAC simulator and combined monitoring with reflection-on-action in a group





Supportive training

- Reflection-on-action → Reflection-in-action
- Learning vocabulary
- Challenging the comfort zone in a safe environment
- No wrong or right – important to reflection on reason for action.

Questions?

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The presented work is part of a project with focus on energy efficiency operation of working vessels and minor ferries with flexible operation profiles

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