Situational Awareness Analysis of Port Pilotage Services

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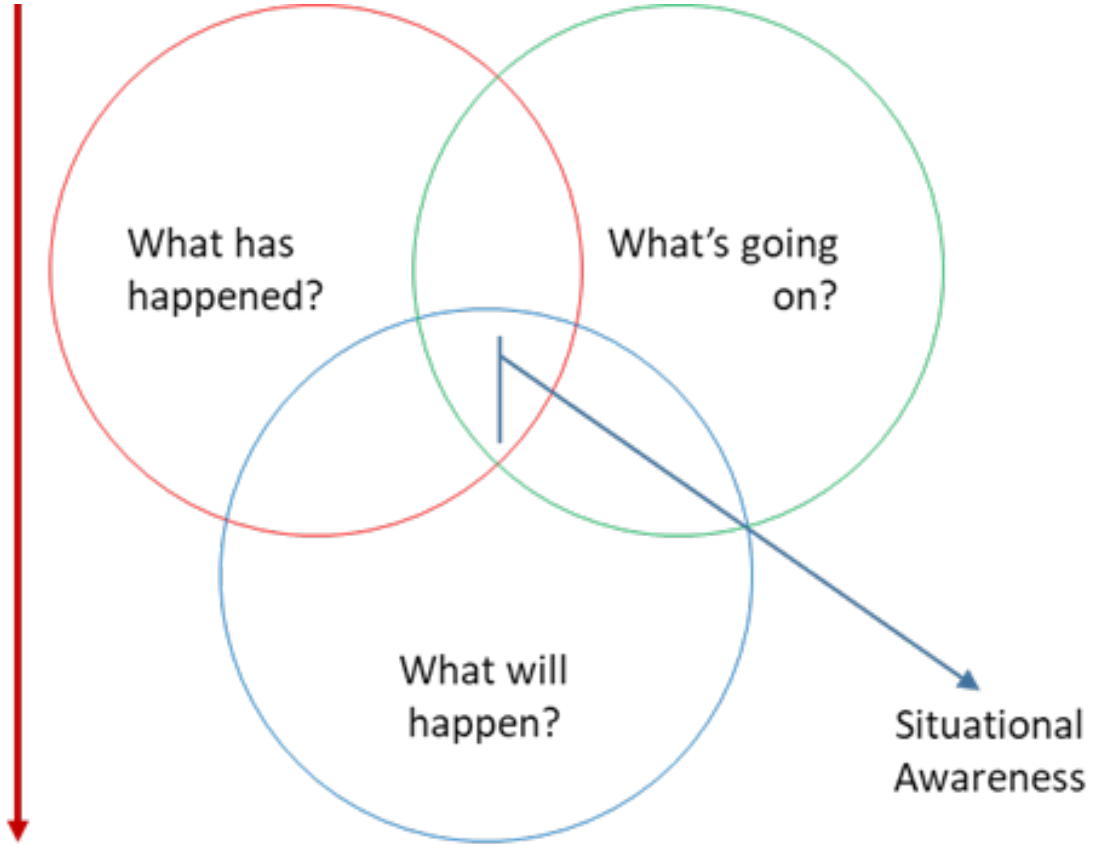
Pilotage-Situational Awareness Key Words

- Dynamic operation
- Safety (HIDDEN IN THE NATURE OF PILOTAGE)
- Maneuvering
- Human factor
- Decision making

Situational Awareness (SA)

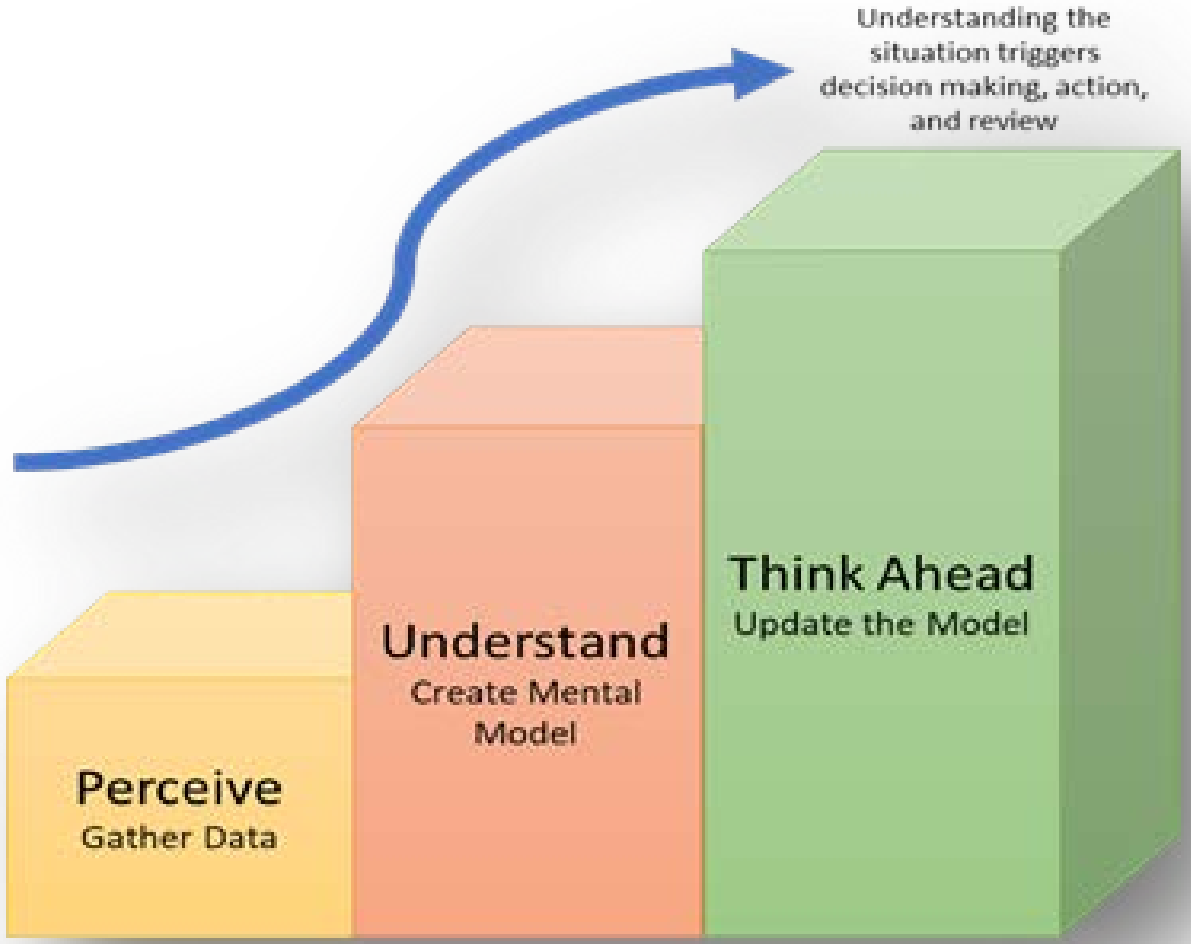


Source: Bingöllü, M.K. (2014: 655)

Concept of SA

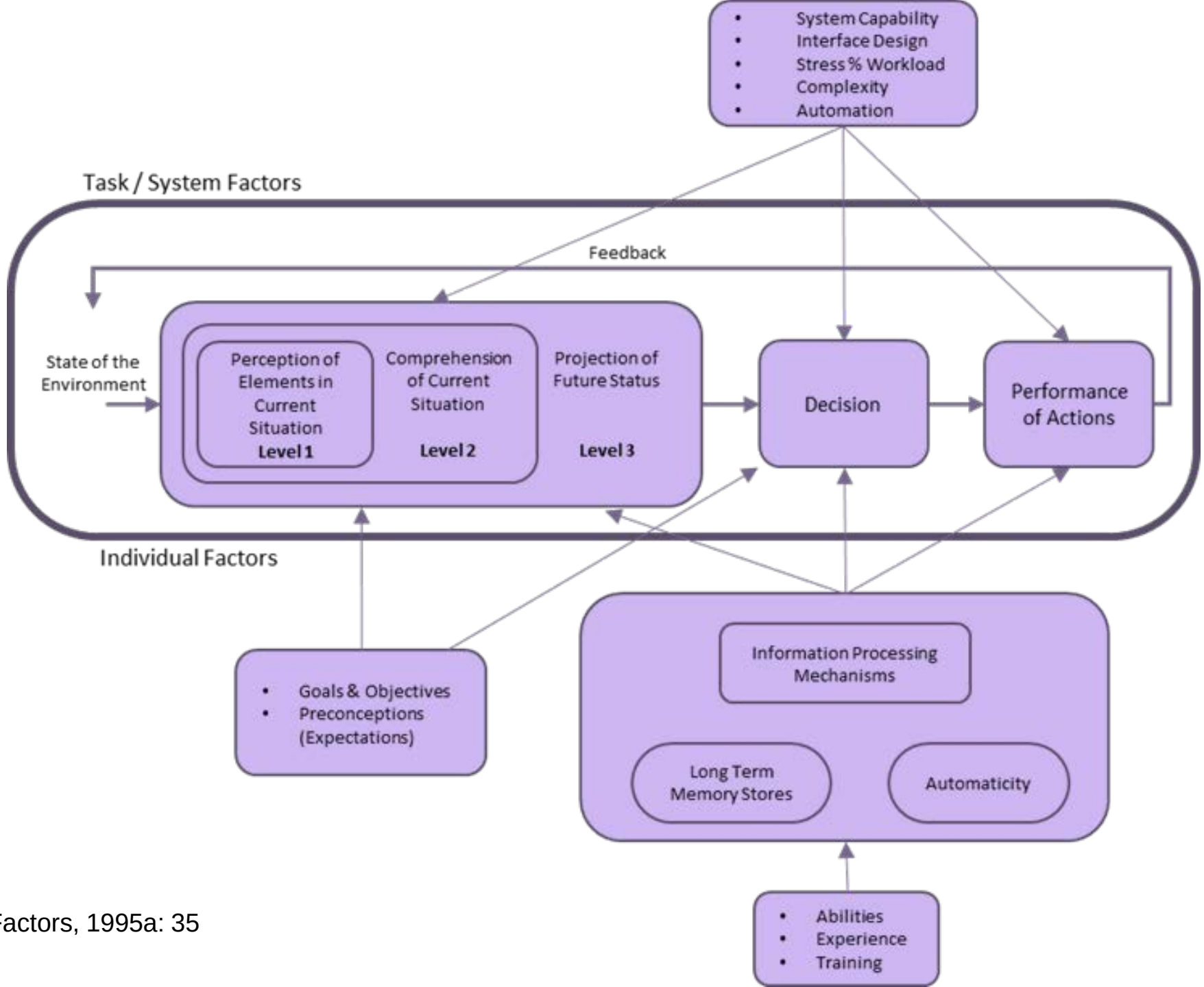
- The concept of situational awareness has originated from pilots in aviation.
- As being aware of the information means at present and in the future
- Perceiving what is going on around us at a specific place and time, acquiring all the happenings and projecting them to the near future.
- It is of great importance in carrying out operational tasks and reaching the targets at such tasks (Endsley and Jones, 2004: 13).

Threefold Step of Situational Awareness



Source : Airbus Group, Flight Operation Briefing Notes (2007)

Situational Awareness Dynamic Decision Making Models



Source: Endsley, M.R., Human Factors, 1995a: 35

Interrelationship of Situational Awareness, Decision Making, and Performance

Source: Endsley, Jones (2004: 11)

- Let’s talk about examples in maneuvering

SA 1- Perception

- The pilot involved in such tasks is in need of some accurate information about the speed of the ship at that moment, the ship length, the type of the ship engine, and draft.
- The shipmaster provides the pilot with the "pilot card" comprising all the maneuvering characteristics of his/her ship.
- The pilot, who is well informed about the weather and sea conditions, explains the maneuvering scenario to the shipmaster.

SA 2-Acquisition Step

- The pilot then contacts with the minimum number of tugboats needed for the maneuver, the dock master who will help fasten the lines, which will keep the ship at the berth.

SA 3-Projection Step

- The pilot arranges his / her commands for approaching the ship to port in accordance with this step. He / she calculates throughout the whole maneuver safety risks. While commanding the maneuver.
- He / she emphasizes / prioritize safety principles. During this maneuvering, the pilot also takes into consideration the actions to be taken in any case of emergency.

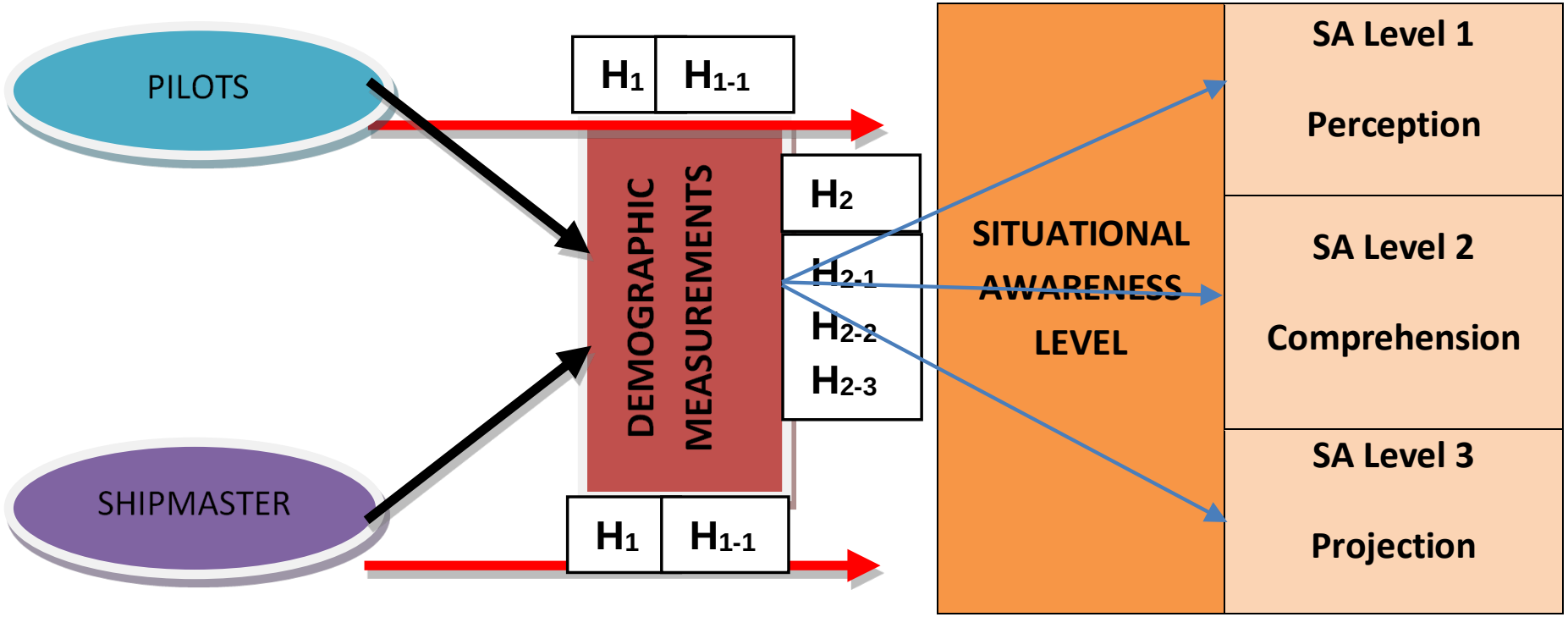
Loss of SA

- Throughout all this maneuvering operation, there are many external effects besides any likely emergencies, which might break the attention of the shipmaster / pilot. Some of such external attention breaking effects are as follows;
- The maneuvers of other ships entering the manoeuver VHF channel, the conversation made, and listened through other VHF channels,
- The direct or indirect effects of the other crew on the bridge,
- The questions and warnings announced by the port authorities about the manoeuver or ship,
- The approach of the tugboat and released lines which break attention local sea traffic and port traffic,
- Time concern regarding the consecutive maneuvers.

The subject and main purpose of this study

- What is the Situational Awareness in port pilotage services and achieving safe port maneuvering?
- To reveal and emphasize the importance of situational awareness in port pilotage services.
- The study also aims to determine whether the level of situational awareness differs with shipmasters and pilots and clarify in terms of what this level is observed to differ.
- It has been investigated whether there are differences in terms of SA between the shipmasters and the pilots serving in the region and the pilots serving in other regions
- Besides, it is aimed to determine which features stand out in terms of SA.

Model of the Research



The hypotheses of the study

- **H1: The level of situational awareness of pilots differs from the level of situational awareness of shipmasters.**
- H1-1: The level of the situational awareness of the pilots employed at the region differs from the level of the situational awareness of the other pilots and shipmasters.
- H2: The level of the situational awareness of the pilots and shipmasters differs in terms of their demographic specifications.

The hypotheses of the study

- H2-1: The level of the situational awareness of the participants below the age of 40 differs from the situational awareness of those above the age of 40.
- H2-2: The level of the situational awareness of the participants whose sea experience is below 10 years differs from the level of the situational awareness of those whose sea experience is above 10 years.
- H2-3: The level of the situational awareness of the pilots who have more than one certificate is higher.

What is your opinion?

The Methodology of the Study

- SAGAT method-the level of the situational awareness of the participants is scaled using not real ship but simulators have been used, in agreement with the researches in aviation.
- The simulation system used in the study has been carried out through “Port Modelling Simulator”. The Software of the simulation used has been created by Transas - Wärtsilä, designed so as to meet all the requirements of IMO STCW/95 convention, and enabling to test the maneuvers in real environment involving all the environmental effects.

The container ship model

OS 1 Info : Feeder container ship 1 (1610 TEU)

View

Type of engine	Slow Speed Diesel (1 x 12640 kW)
Type of propeller	CPP
Thruster bow	Yes
Thruster stern	Yes

General information

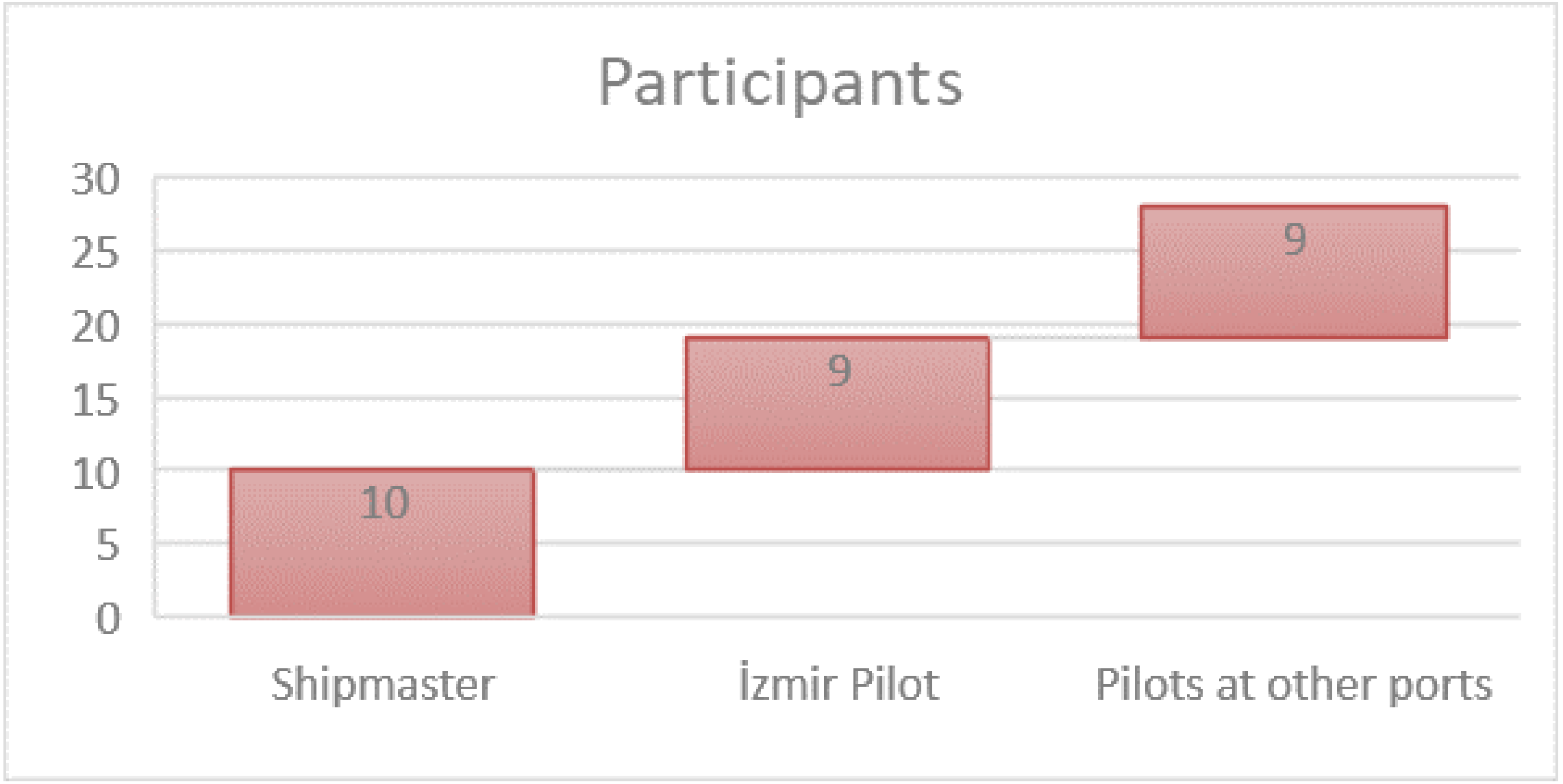
Vessel type	Feeder container ship 1 (1610
Displacement	24080.0 t
Max speed	20.5 knt

Dimensions

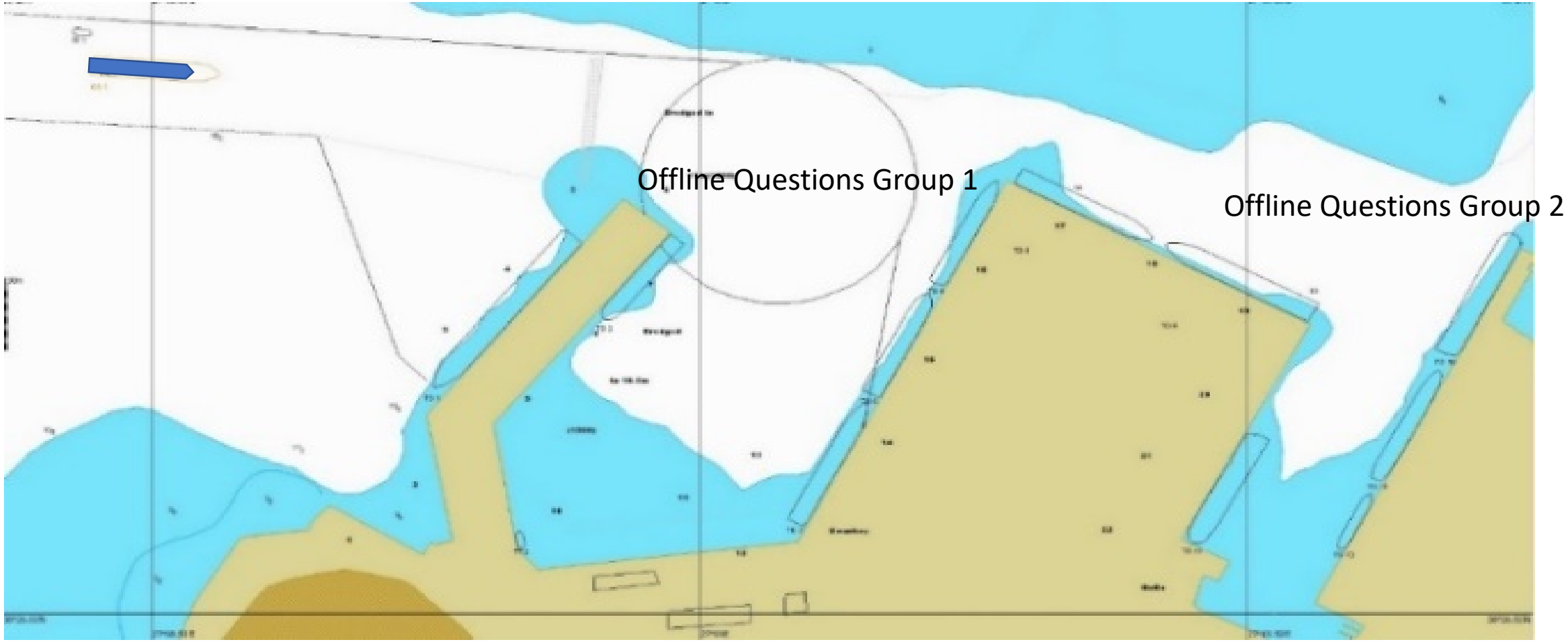
Length	169.0 m
Breadth	27.2 m
Bow draft	8.5 m
Stern draft	9.5 m
Height of eye	31 m

Study Process

- A total of 35 participants, three of whom have taken in the test process and two of whom as control groups, have been involved in the simulation experiments. 28 participants have been accepted in SA evaluation.


Participants
30
25
20
15
10
5
0
10
9
9
Shipmaster
İzmir Pilot
Pilots at other ports

The Map and Simulated Scenario at Port of İzmir



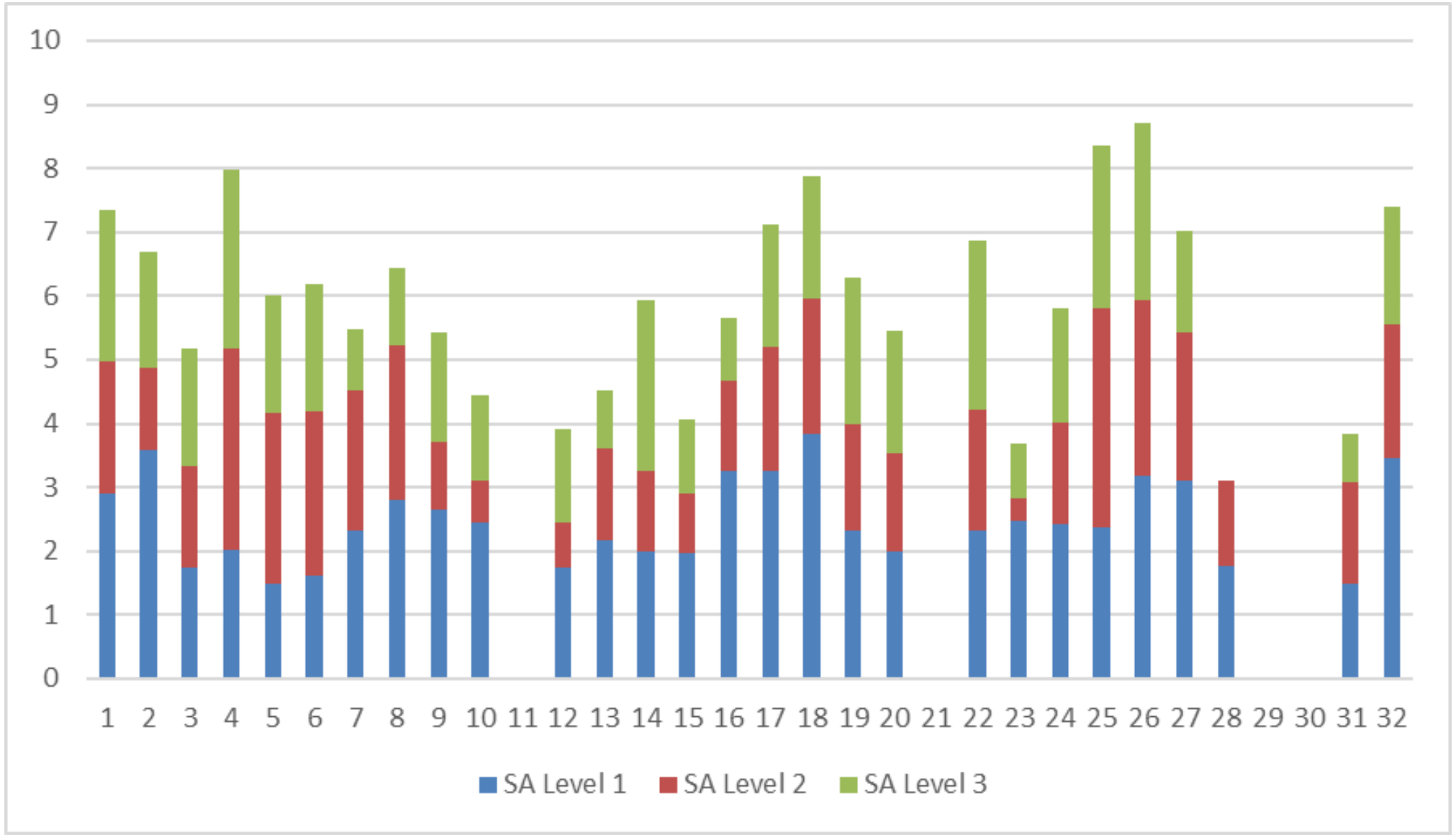
Scenerio (Offline Questions Group 1)

- N1: The current wind force is increased to 20 knots for 20 seconds at 4 minute intervals, after starts.
- N2: When the passenger's pier and the berth No: 6 were passed the simulation will stopped and “Offline Questions Group 1” will filled.
- 1. What is the speed you are planning to follow? SA 3
- 2. What is your speed right now? (Log speed) SA 1
- 3. What is your heading now? SA 1
- 4. Where do you expect the bow of the ship to turn because of the wind effect? SA 3
- 5. In which direction did the helicopter go? SA 2
- 6. Please, mark your ship’s bridge position to the figure below. SA 2

Scenerio (Offline Questions Group 2)

- N3: Simulation will resumed and the participant will continued the maneuver.
- N4: After passing through the docks No: 6, the wind force gusts up to 20 knots (25 knots due to thunderstorms) and its direction changes to 010. The rainfall will increased to 80% and the visibility below 1 nm (1500 m). In addition, gyrocompass and bow thruster failure will be given.
- N5: When the ship that is start to turn her port side, the simulation will stopped again and “Offline Questions Group 2” will filled.
- 1. During the backward, how long do you plan to distance the quay corner (#20 & #21)? SA 3
- 2. What is your speed right now? SA 1
- 3. What is your current distance to the ship ahead? SA 2
- 4. Is there any equipment that you realize not working up to now? SA 2
- 5. What is wind direction right now? SA 1
- 6. Please, mark your ship’s bridge position to the figure below. SA 2

Total SA Values of Participants



Conclusion

- It was observed that there was **no significant difference between** the situational awareness and situational awareness levels of the **ship captains responsible for the ship and the pilots responsible for serving.**
- It was also determined that situational awareness in terms of port maneuvers **did not create a difference regarding the age of the captain/pilot** performing the maneuver.
- The situational awareness **did not differ between pilots working in a certain region and pilots working in different regions.**

Conclusion

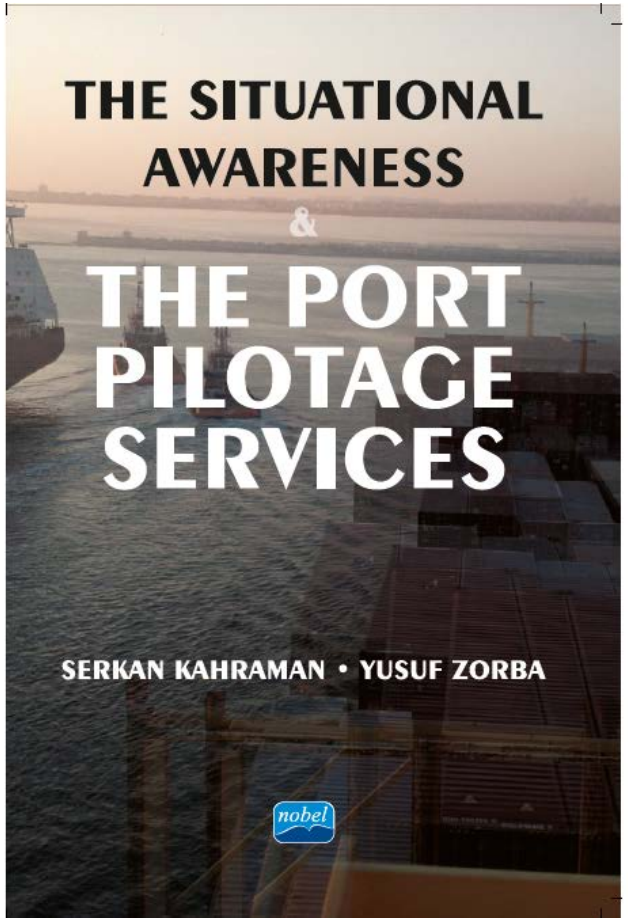
- However, **it has been determined** that there is a difference in terms of situational awareness levels between those **who have completed 10 years in the profession and others.**
- Another result is **that there is a differenc**e in situational awareness levels between **pilots who have licenses to work in more than one region and pilots licensed for serving only one area.** It was also revealed that there is a bilateral relationship between comprehension and projection level of situational awareness.
- According to all these results given above, it is revealed that the experience of pilots and shipmasters is extremely important for maintaining safe maneuvers.

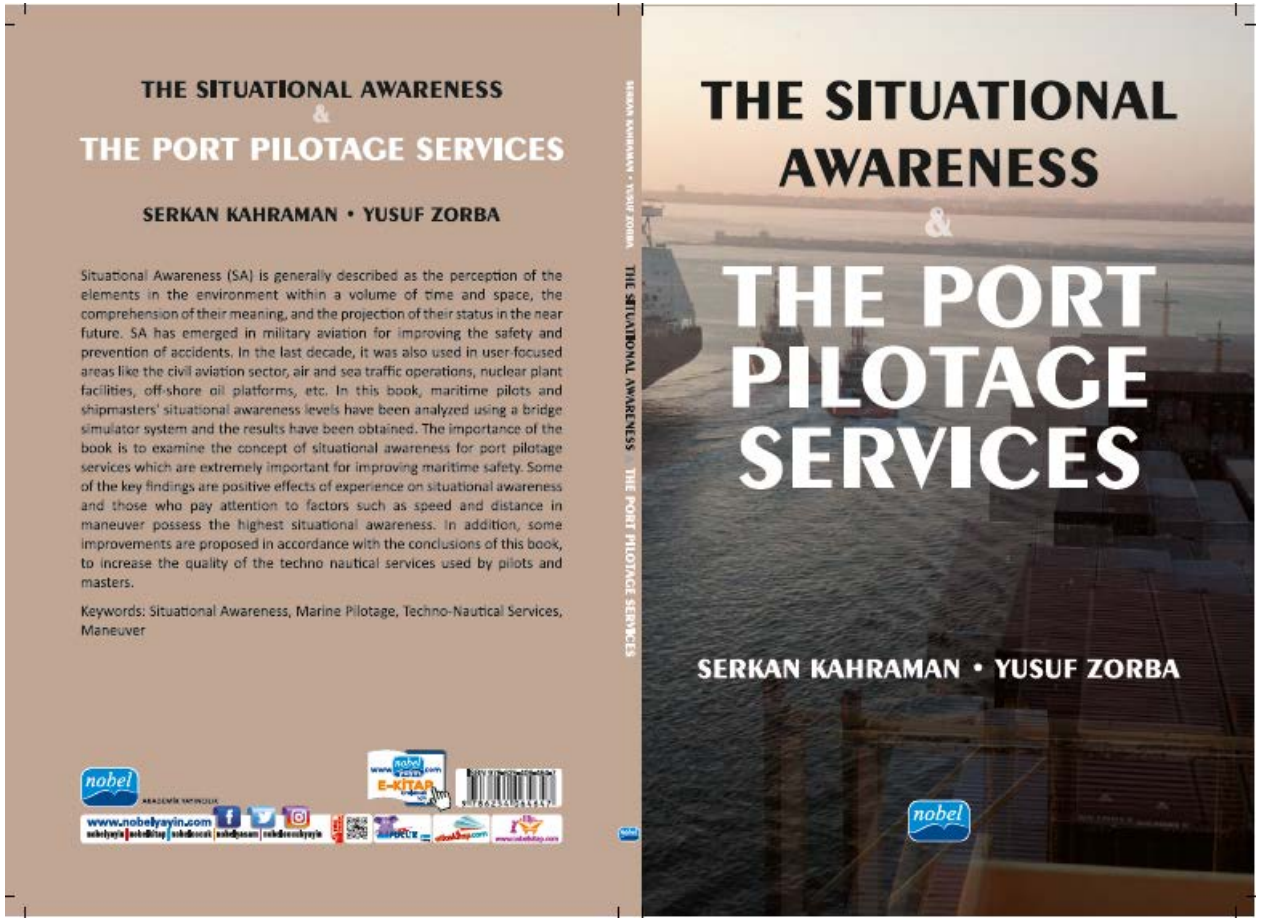
Further Studies

- In pilotage services; situational awareness is an important factor to be taken into consideration, to be scaled (measured), evaluated, improved and periodically retested.
- Hence, an important proposal implied through this research should be taken into account:

During the first recruitment and employment step as well as the in-service training conduction, maritime/shipping companies should collect some initial information about the candidates for shipmaster positions particularly in terms of their attentive and cognitive specifications through applying to them a “situational awareness test”. Some should be practiced by pilotage companies on the candidates to gain the “pilot” position.

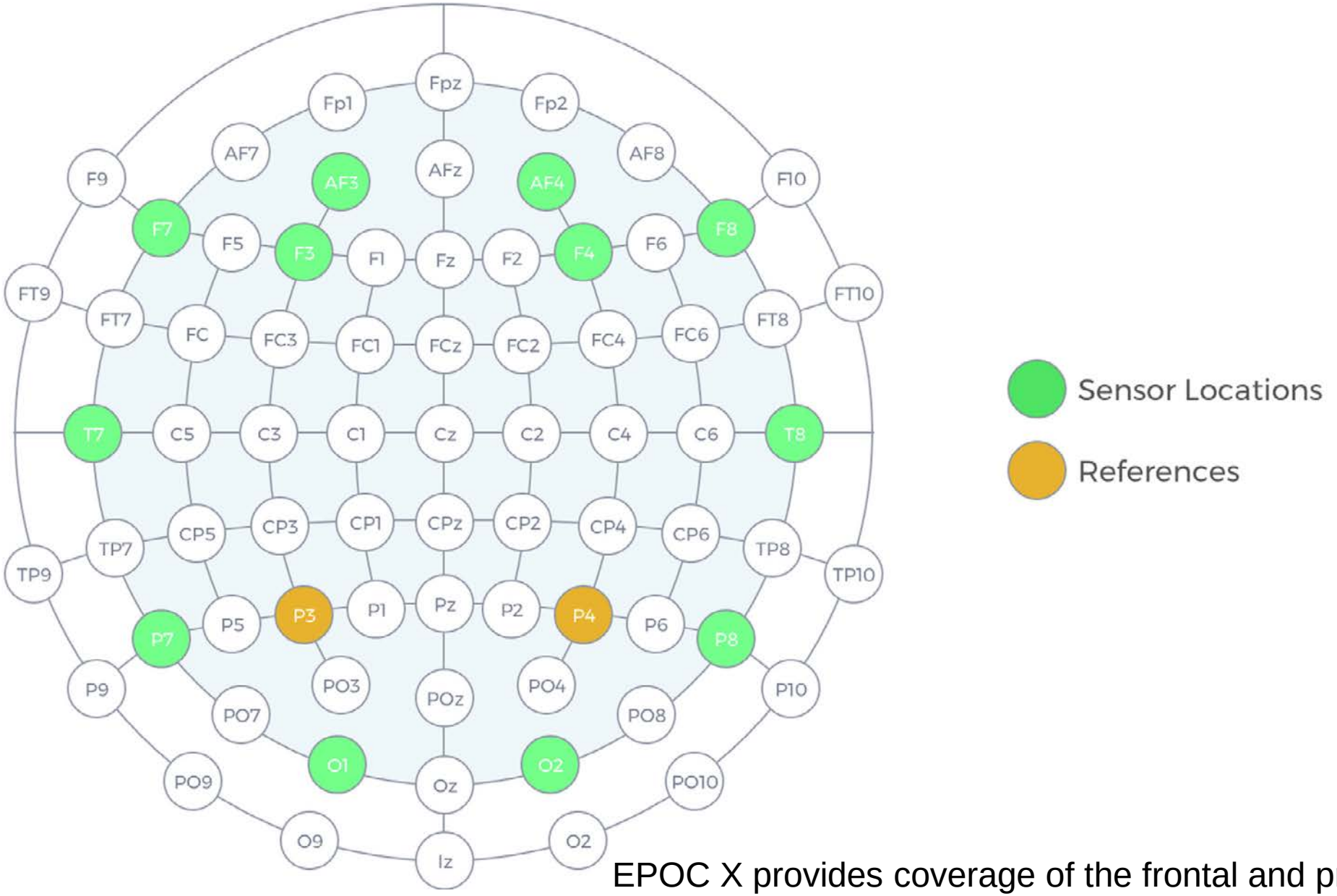
More details and info in my book:





Next study: EMOTIV EPOC X 14 Channel Mobile Brainwear®

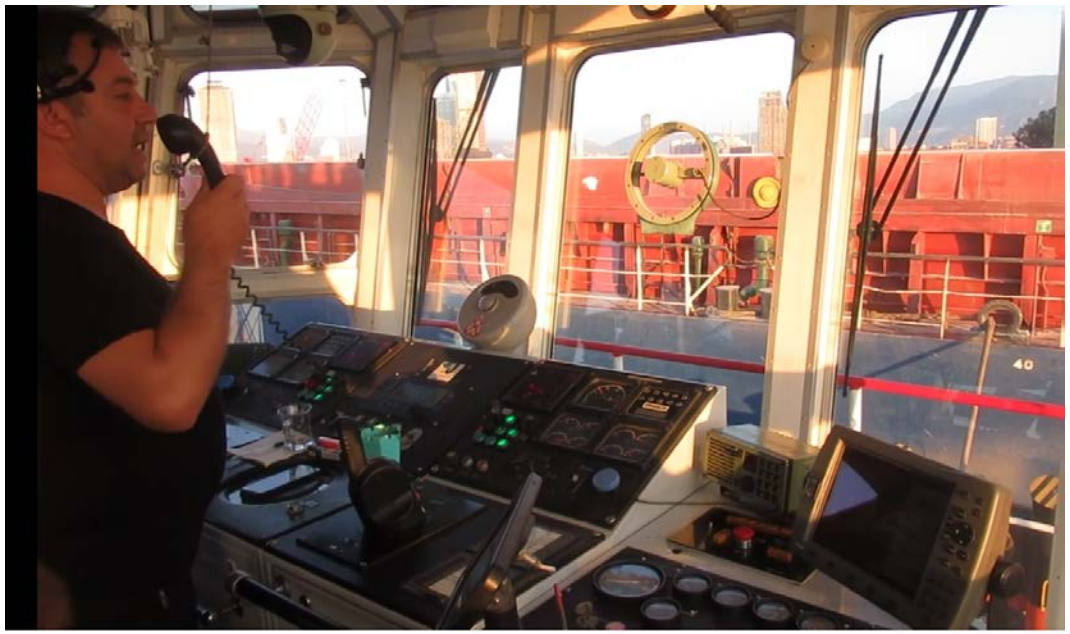
14 channels Emotiv Epoc X equipment covergae



Source: Emotiv, 2020

EPOC X provides coverage of the frontal and prefrontal lobes; it also provides coverage of the temporal, parietal and occipital lobes. The image above shows the sensor locations for EPOC X using the international 10-20 system.

Next study:
Neuroscience approach to situational awareness: A research on marine navigation



The aim is to research the main neurophysiological findings related to the ship user's measurements of brain activity during the real navigational performance and the relationship between certain aspects of this brain activity and the "situational awareness concept" and differences in other variables.

- Thank you very much.