ESTONIAN MARITIME ACADEMY OF
TALLINN UNIVERSITY OF TECHNOLOGY

LATVIAN MARITIME ACADEMY
RESEARCH INSTITUTE

LITHUANIAN MARITIME ACADEMY

JOURNAL OF MARITIME TRANSPORT AND ENGINEERING

Volume 7, No 1

ISSN 2255-758X

2018

EDITORIAL CORRESPONDENCE

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Each article submitted to the journal is subject to double blind-peer review.

CONTENTS

THE USE OF SATELLITE SCATTEROMETRY AND ALTIMETRY DATA FOR WIND AND WAVE MONITORING IN THE CENTRAL PART OF THE BALTIC SEA AND THE GULF OF RIGA

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Abstract
Winter storms are a frequent hazard in the Baltic Sea region, causing substantial damage in the coastal areas and affecting various fields and infrastructures, including air and marine traffic. Even though the accuracy in forecasting such events has increased significantly over the past decades, scarce observation network over marine areas still poses challenges for operational monitoring, navigation and operations. At the same time, the availability of satellite-observed environmental parameters over both land and marine areas has been gradually increasing. Therefore, this study was carried out in order to assess the possibilities of using data from ASCAT scatterometer aboard the polar-orbiting MetOp satellites and altimeter sea surface topography data from SARAL and OSTM missions as a source of accurate and timely meteorological information. For this purpose five selected high wind cases were analysed, representing different scenarios of storm movement, severity and the impacted marine and coastal area.
Keywords: *ASCAT, satellite altimetry, marine observations, wind, significant wave height.*

Introduction

Comprehensive assessment of wind and wave parameters over the global ocean has for long been a challenge for both meteorologists and seafarers, as well as other specialists whose operations are directly influenced by the characteristics and variability of the marine environment. Though in-situ measurements remain the primary source of wind and wave information, they are still scarce and do not ensure comprehensive mapping over the oceans [29]. This is in part because conventional modes of collecting data have difficulties recording environmental changes in the ocean surface – they provide localized information leading to fragmented knowledge [21]. Therefore, limitations in data availability over the ocean areas still are a crucial influencing factor for the assessment of environmental conditions on temporal scales of various lengths for applications including ocean circulation analysis, meteorological nowcasting and forecasting, wind power assessment and others [8]. At the same time, advancement in technology has led to an increased availability of remote-sensing observations applicable for the monitoring of various meteorological phenomena. Space-borne scatterometers and altimeters operate at microwave frequencies and therefore are not influenced by cloud cover – this enables the retrieval and operational applications of such atmospheric phenomena as frontal disturbances, winds, sea ice, wave height and others [24; 27].

Ocean winds are considered to be the most important variable for the analysis of storm surge and wave forecasts at various spatial and temporal scales. Nowadays scatterometers aboard the polar-orbiting satellites are the main source of surface wind speed and direction over the global ocean [9]. Wind scatterometers are instruments used for inferring wind speed and direction from radar measurements of the sea surface. These instruments rely on the fact that winds blowing over a water body influence the radar backscatter properties of the surface in a manner related to wind speed and direction [9; 24; 27]. While scatterometer wind measurements are limited to wind speeds of 40 m/s [27], several studies have demonstrated high accuracy of scatterometer products, showing that on global scale the difference from in-situ observations does not exceed 2 m/s and 20° for wind speed and direction respectively [1; 9]. However, underestimation of strong winds by ASCAT has also been reported: the validation results have shown a reduction in wind speed of 0.6 m/s for winds greater than 15 m/s [29]. Other limitations of satellite wind retrievals include inadequate temporal sampling of atmospheric variability, data contamination very close to the coast and contamination by the effect of rain. These limitations reduce the

overall number of reliable observations [9]. In order to ensure high quality of the obtained products, scatterometer observations are operationally monitored and undergo advanced calibration, validation and cross-comparison [12].

Altimetry data are a valuable source of near-real-time observations of significant wave height, however they suffer from limited spatial and temporal coverage due to their high sampling rates [2]. The comparison between the significant wave height data from satellite altimetry data and the measured buoy data also has shown good agreement, especially for Jason-2 products. However, it has been stated, that satellite altimeter observations have been less reliable with significant wave heights below 0.5 m. Nevertheless, satellite altimeter measurements are a good data source to depict wave variability even near the coast [7; 22]. The most prominent limitations of satellite altimetry are associated with the fact that a satellite takes at least 10 days to return and measure sea state conditions at the same point as well as the characteristics of the sensors, which enable measurements only directly beneath the satellite [13; 21].

Winter storms are a frequent hazard in the Baltic Sea region, causing substantial damage in the coastal areas and affecting various fields and infrastructures, including air and marine traffic. Even though the accuracy in forecasting such events has increased significantly over the past decades, scarce observation network over marine areas still poses challenges for operational monitoring, navigation and operations [26]. At the same time, the availability of satellite-observed environmental parameters over both land and marine areas has been gradually increasing. While benefits of the use of satellite data for meteorological monitoring and analysis have been identified for various atmospheric phenomena in Latvia [4; 5; 6; 28], limited research exists on the applicability of remote-sensing observations for the analysis of the marine environment in the coastal areas of the country [14; 18]. Therefore, this study was carried out in order to assess the possibilities of using data from ASCAT scatterometer aboard the polar-orbiting MetOp satellites and altimeter sea surface topography data from SARAL and OSTM/Jason-2 missions as a source of accurate and timely meteorological information. For this purpose five selected storm cases were analysed, representing different scenarios of storm movement, severity and the impacted marine and coastal area.

Material and methods

Five storm cases (December 6, 2013; March 15, 2014; October 28, 2013; September 23, 2013 and October 22, 2013) were chosen for the analysis, representing different scenarios of storm movement, severity and the impacted marine and coastal area of the Central part of the Baltic Sea and the Gulf of Riga. For these storm cases, maximum observed mean wind speed and wind gusts were calculated by using surface observations from the coastal weather stations in the area obtained from Latvian Environment, Geology and Meteorology Centre (LEGMC), Estonian Environment Agency (ESTEA) and Swedish Meteorological and Hydrological Institute (SMHI).

For all five cases under study, the temporally closest available satellite-based information was identified and obtained from the data archives managed by EUMETSAT (European Organization for the Exploitation of Meteorological Satellites) and AVISO. For the assessment of wind speed and direction over the aquatic area, observations by the ASCAT sensor were used. ASCAT is a product of EUMETSAT [10] OSI SAF (Satellite Application Facility on Ocean and Sea Ice) [20]. It is a C-band radar scatterometer operating at 5.255 GHz and providing two independent swaths of backscatter retrievals. ASCAT is an instrument aboard the MetOp platform operating in a sun-synchronous polar orbit [16; 23; 24]. In this study, we used the ASCAT Level 2 Operational and Optimized Coastal Ocean Near-Real-Time ocean wind vector datasets at 12.5 km spatial resolution available as close as 10 km from the coast and at a height of 10 m above the sea surface [12; 24; 27; 29]. Research has shown the high-resolution coastal product shows the highest accuracy in comparison to other ASCAT products [8]. For the assessment of significant wave height on the days under analysis, the altimeter sea surface topography data from SARAL and OSTM/Jason-2 missions were used. SARAL (Satellite with ARgos and ALtika) satellite embarks the AltiKa altimeter working in Ka-band in 35 GHz mode, while OSTM/Jason-2 embarks a Ku band altimeter Poseidon which provides products along track in 13.6 GHz mode [3; 11; 21]. The obtained satellite observation data were analysed by using an open-source data analysis software tool McIDAS-V [25].

Results

The presented here study represents the assessment of the applicability of remote sensing observations for operational wind storm monitoring in the Central part of the Baltic Sea and the Gulf of Riga. The focus of the analysis has been set towards the time when the maximum wind speeds have been observed in the surface observation stations on the particular dates. Thus, Figures 1–5 as well as the characteristics presented below provide an insight into the usefulness of available satellite information during the most hazardous times of the high wind events. The intercomparison is comprised of the ASCAT 12.5 km coastal winds displayed according to the Beaufort scale, wind observations from the surface weather stations and available altimeter significant wave height information.

The first case on **December 6, 2013** describes a synoptic situation with the centre of a low pressure area located over the Central part of the Baltic Sea. On this date, the maximum wind speed measured by surface observation stations reached 9/14 to 20/29 m/s at the Sea and most part of the Gulf (Figure 1). ASCAT data were available after the time of the maximum winds (at about 00:00 UTC), and during the overpass (at about 08:30 UTC) the centre of the storm was over the Central part of the Baltic Sea. Therefore, at this time the strongest winds – 10/13 to 14/20 m/s – were observed over the aquatic areas, but on the coast of Latvia the wind was already between 2/4 to 12/17 m/s. In this case, the greatest benefit of ASCAT measurements was the ability to fully analyse the wind field and distribution over the Sea. Altimeter data was not available over the area of interest.

The second case on **March 15, 2014** also describes a situation with the centre of a low pressure area moving over the Central part of the Baltic Sea (Figure 2). Maximum wind during the storm in the coastal areas was 10/27 to 25/35 m/s, as registered by the in-situ weather stations. The ASCAT overpass was available slightly before the time of the maximum winds (at about 08:30) – when at the Open Sea the wind speed was 16/24 to 22/27 m/s and 4/7 to 12/16 m/s over Latvia and the Gulf. On this particular date, ASCAT observations generally represent the characteristics of the wind field observed by the surface stations, and the spatial distribution of the local maxima can be clearly identified from the data. At the same time altimeter information has been scarce on that date, and therefore presents not much benefit for operational storm monitoring.

The third case on **October 28–29, 2013** represents the most intense storm case of those presented within this study – this particular storm ranks as the 11th most severe storm observed in Latvia since the beginning of instrumental observations [17]. Maximum wind measured by surface stations (at about 00:00 UTC on October 29) was 16/27 to 22/34 m/s at the Sea and 9/19 to 18/29 m/s in the Gulf (Figure 3). The ASCAT overpass was available before the time of the maximum winds (at about 20:00 UTC), and at this time the wind reached 13/26 to 21/31 m/s at the Open Sea, and 5/11 to 16/21 m/s over Latvia and in the Gulf. ASCAT observations represent the wind field well, however, similarly to the two previous cases, for the particular data product there was no data coverage over the Gulf of Riga. At the same time data products in coarser spatial resolution were available over the whole area of interest. Altimetry information obtained approximately at the time of the maximum winds gives valuable insight into the distribution of significant wave height in the Central Baltic Sea.

The last two cases represent less severe conditions, with maximum wind gusts generally not exceeding 20-23 m/s. The weather conditions and wind distribution over the area of interest on **September 23, 2013** was determined by the rear part of a low pressure area. The maximum wind during this less extreme event was between 7/15 and 18/23 m/s, while at the time of the ASCAT overpass (at about 19:00 UTC, just before the time of the maximum winds) the wind at the Sea was 11/16 to 18/23 m/s, but in the Gulf the wind was still quite mild: 4/6 to 11/16 m/s (Figure 4). During this event, the added value of ASCAT information was low because of poor spatial and temporal coverage. Altimetry information was available well before the time of the maximum winds (at about 12:00 UTC) in this case, and therefore indicative of the mean wave height prior to the increase in wind speed and not the maximum observed during the event.

On **October 22–23, 2013**, the east part of a low pressure area was located over the Baltic Sea. Maximum wind during this event was between 8/14 and 15/18 m/s in the open part of the Baltic Sea and the north part of the Gulf of Riga (Figure 5). The ASCAT overpass was available before the time of the maximum winds (at about 19:00 UTC), when the wind was between 7/12 and 13/17 m/s. Similarly to the previous event, in this case the added value of ASCAT information was low. The altimetry data available at about 06:00 UTC on October 23 represented the wave height after the event, which can be beneficial for monitoring purposes.

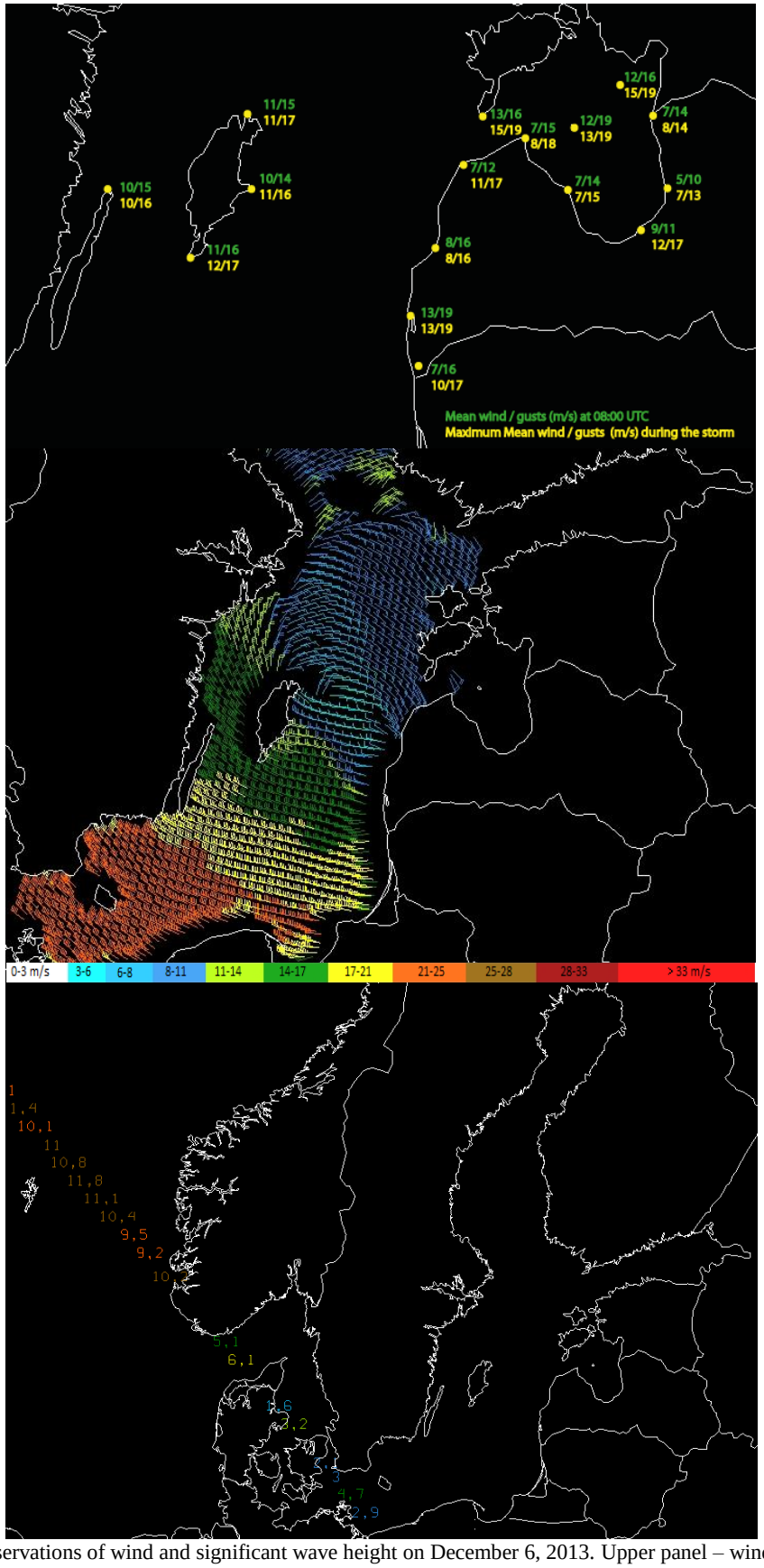

Figure 1. Observations of wind and significant wave height on December 6, 2013. Upper panel – wind speed (m/s) obtained from surface weather stations; middle panel – wind speed (m/s) and direction obtained from satellite measurements; lower panel – significant wave height (m) obtained from satellite measurements.

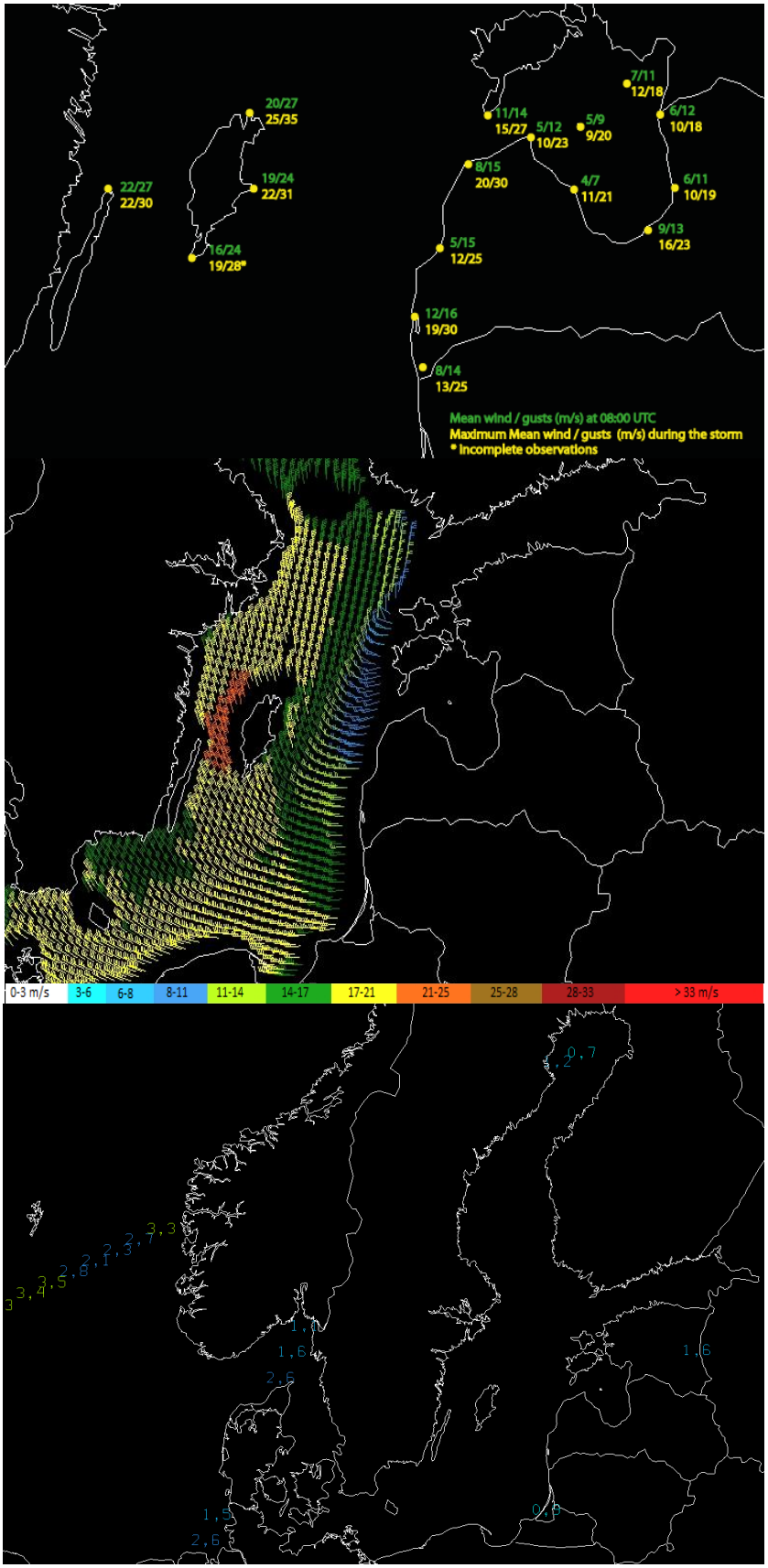

Figure 2. Observations of wind and significant wave height on March 15, 2014. Upper panel – wind speed (m/s) obtained from surface weather stations; middle panel – wind speed (m/s) and direction obtained from satellite measurements; lower panel – significant wave height (m) obtained from satellite measurements.

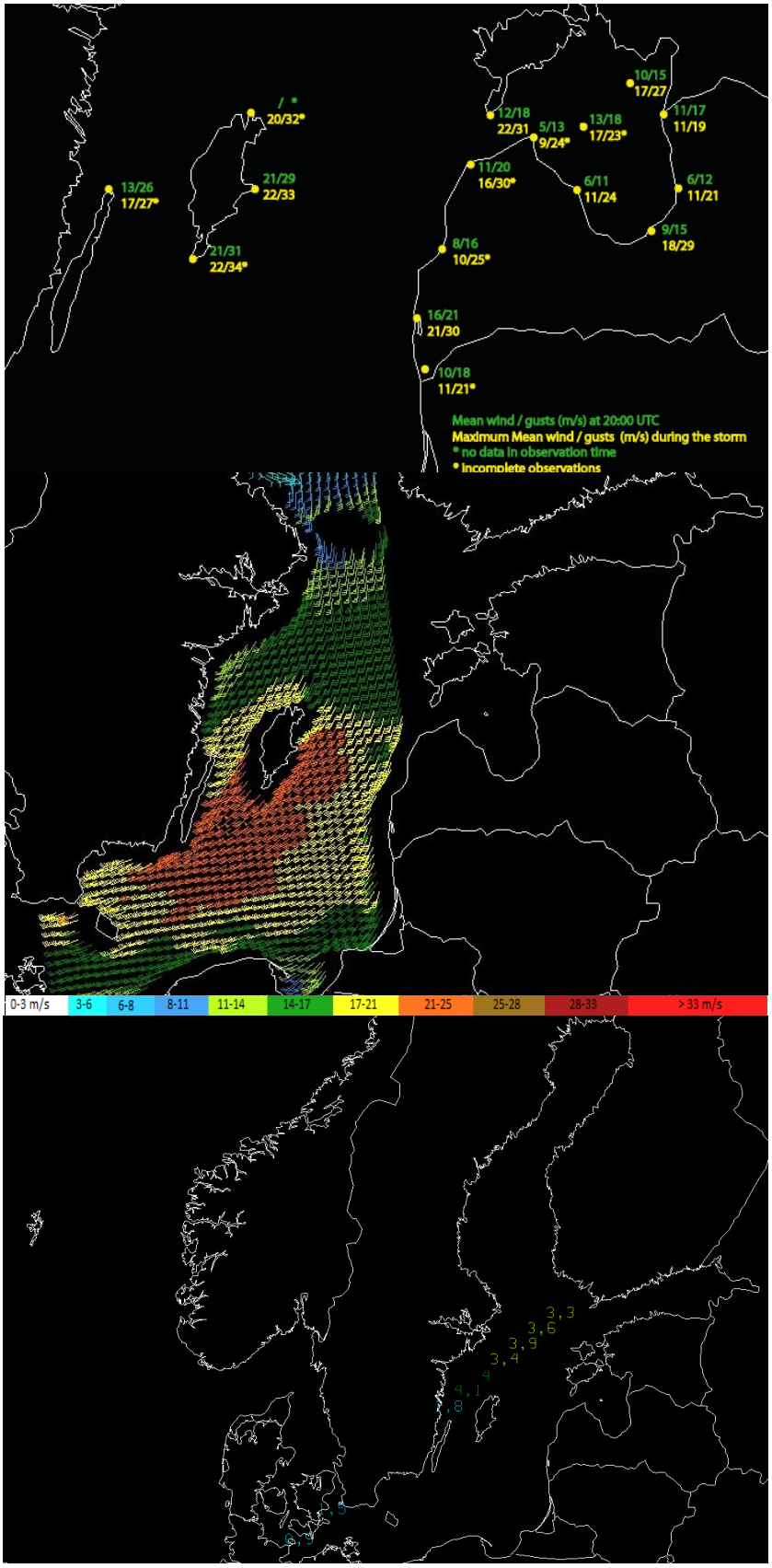

Figure 3. Observations of wind and significant wave height on October 28–29, 2013. Upper panel – wind speed (m/s) obtained from surface weather stations; middle panel – wind speed (m/s) and direction obtained from satellite measurements; lower panel – significant wave height (m) obtained from satellite measurements.

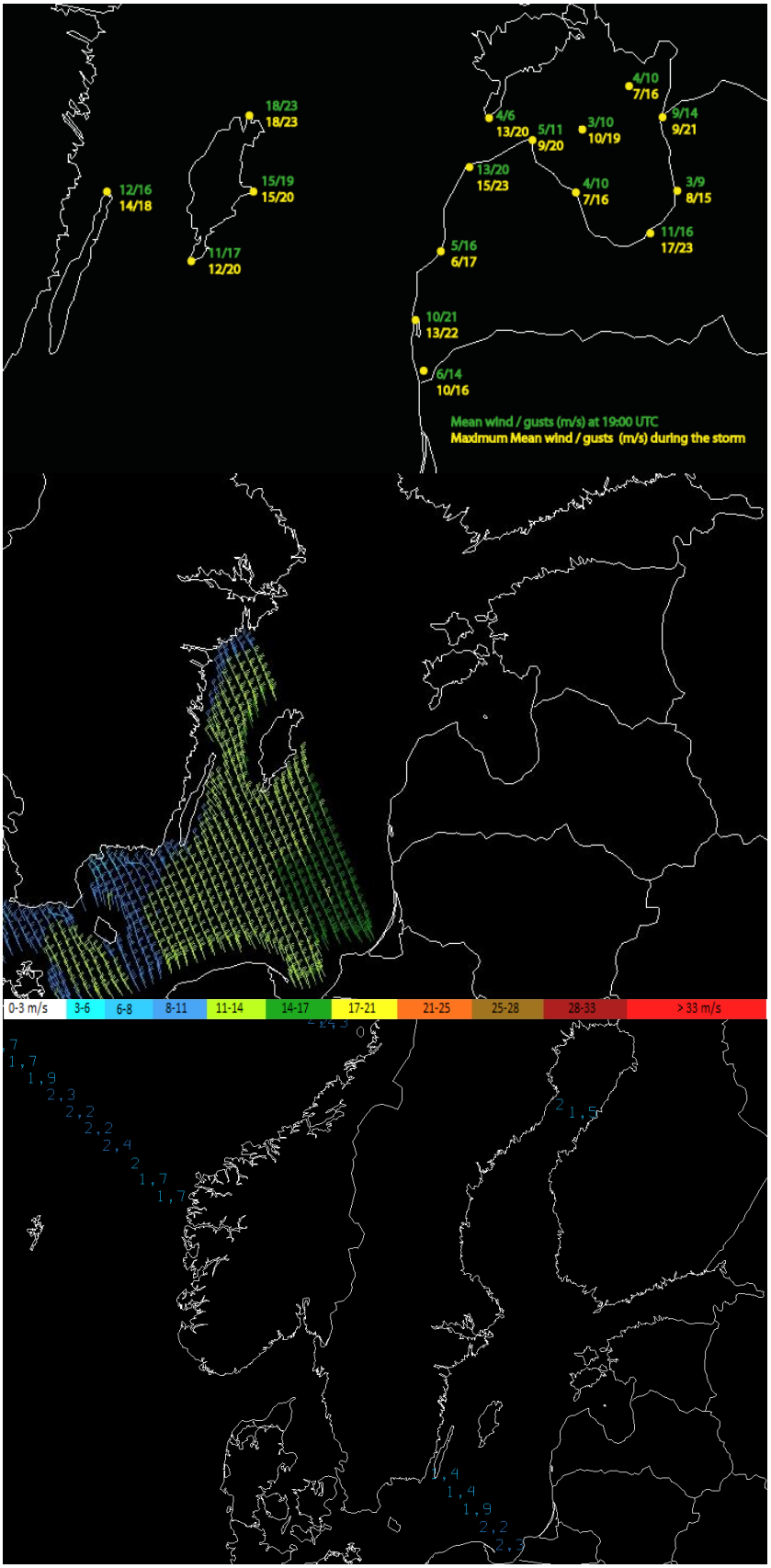

Figure 4. Observations of wind and significant wave height on September 23, 2013. Upper panel – wind speed (m/s) obtained from surface weather stations; middle panel – wind speed (m/s) and direction obtained from satellite measurements; lower panel – significant wave height (m) obtained from satellite measurements.

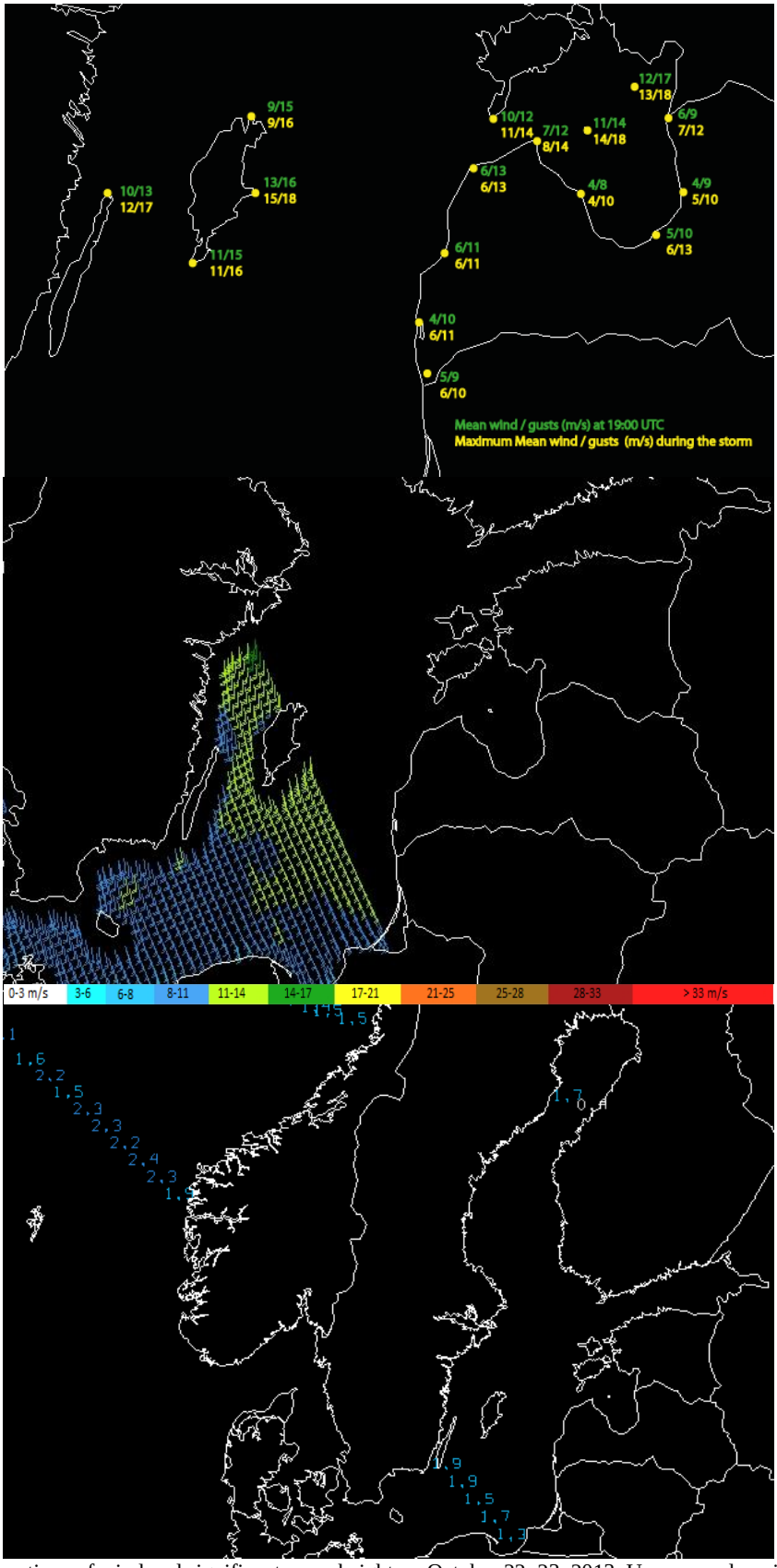

Figure 5. Observations of wind and significant wave height on October 22–23, 2013. Upper panel – wind speed (m/s) obtained from surface weather stations; middle panel – wind speed (m/s) and direction obtained from satellite measurements; lower panel – significant wave height (m) obtained from satellite measurements.

The analysis of five selected high wind cases over the Central Part of the Baltic Sea and the Gulf of Riga has revealed both benefits and limitations of operational applications of remote sensing data for wind and wave monitoring. The most prominent limitation of satellite observation information is the availability – it is rare that satellite overpasses perfectly match the synoptic situation and needs of the observer. Such limitations have been also pointed out within other studies; however, the applicability of satellite observations can be more useful when information obtained from several satellites is used. Sun-synchronous polar-orbiting satellites observe locally at fixed hours, thus in case of significant diurnal wind and wave variations occurring at a site, the readings may not be fully representative when using observations from only one satellite [12; 21]. During the intercomparison of the available data, the data coverage, spatial resolution and the possibility to depict fine-scale structures in the wind field were recognized as the greatest benefits of the use of satellite observations for marine monitoring. Thus, the study also shows the great benefit of the high accuracy and representativeness of satellite data on the dates, when the overpass times were favourable for a beneficial use of the obtained information within the monitoring and analysis routines.

It is also important to note that the public availability and accessibility of environmental satellite observation data has been increasing rapidly during the past decade. This enables operational use of the satellite-based information not only to public service providers, but also to the general public and private sector. Several online platforms for accessing satellite products online have been developed. Among those are as well specialized platforms for the distribution and visualization of satellite altimetry and scatterometry information in near-real-time regime [15; 19]. Thus, it is important to increase the awareness of the availability, applicability and added value of satellite observations for marine environment monitoring and analysis among potential data users.

Conclusions

The presented here study assesses the applicability of satellite-based wind and wave information on five selected high wind cases in the Central part of the Baltic Sea and the Gulf of Riga. During the analysis a significant added value of using satellite data for operational wind and wave monitoring was identified: the data coverage, spatial resolution and possibility to depict fine-scale structures in the wind field is crucial for proper analysis of the storm evolution, motion and impact scenario. Despite the fact that the times of satellite overpass do not always match our needs, and thus is not a fully reliable source of information in terms of availability, it is always beneficial at least as an additional source of information. Therefore, it is essential to promote the freely available satellite-based meteorological products among both researchers and operational marine specialists.

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HUMAN FACTOR IN MARITIME - ACTIVATION OF PERSONALITY AS PSYCHOLOGICAL PROBLEM IN CARRYING OUT SEAFARERS FUNCTIONAL DUTIES

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Abstract
The purpose of this qualitative research was to carry out a conceptual analysis of such rarely described psychological element among other human factor elements in maritime as seafarers personality, in particular, the activation of personality. The activation of seafarers personality is proposed to be evaluated in two models of practical activity: usual (ordinary) and unusual (extraordinary), besides, a seafarer, as a socio-psychological and simultaneously biological phenomenon, regardless of the executive role, is analyzed as a specific, singular man in the crew who in his micro-environment is characterised as a purposeful, situationally temporal system. This means that for the first time in Latvia, research of seafarers personality's paradigm has been done and multimodal approach has been used. The analysis of the three elemental paradigms proposed in the study follows from the requirements of the STCWT convention. The findings of this research are confirmed as correct and applicable in other IMO conventions and in the regulation of the national legislation of the Republic of Latvia, as well as in this context for the entire field of the maritime transport operation, including in the military sphere.
Keywords: *human factor in maritime, seafarers personality, routine and real activation of personality, activity, seafarers self-concept, motivation.*

Introduction

One of the essential safe navigation problem questions is human factors in seafaring. In this research activation problem of an abstract individual who is seafarer and actively works in maritime has been described. Inductive approach dominates in the research because the seafarer has been analysed as a concrete, singular person in the crew – psychologically functioning in his microinvironment as purposefully, situative and temporal system. The central figure in the research is seafarer and his personality and there has not been an intention to differentiate advantages of any nations and stales before others to study seafaring and work in this profession for a long term. As a matter of fact, the archetypal approach of K. G. Jung, in a way, gives us the possibility to prognosticate future resources of a particular man as a seafarer – mainly from the particular concept of his ethnos peoples archetipical localization regarding seafarering, navigation etc. The subject of this research – seafarer - apriori is of Europid origin who is antropologically close to present ethnos of the Baltic States in a cultural, mental, religious way and may be their representative.

At present navigation process have the tendency to be utilitarian or pragmatic. For instance, elements of robotics, artificial intellect etc. are being used. At the same time less thought has been given to utilities and comfort of the crew. Naval education and practical training deals mainly with acceptial dogmas as practical navigation is much based on the laws of nature with stable and physical constant factors, relatively little depending on other factors. Still today naval education start applying more issues from the social and psychological cognitive sphere as it has become clear that essential factors in navigation process belong to the man himself and the groups he enters while at work. Seafaring sciences recently use more knowledge from social sciences – psychology included.

Actuality of the problem of this research: methods, model and the main questions

As the scientific interest of specific sides of personality grows in different spheres of human activities, it is necessary to investigate particular qualities of the changes depending on their "extreme circumstances" and grades at which individuals perform their activities. Recently the term "extreme circumstances" has developed new shades of meaning because it is now connected to alteration of criteria for the classification of situations and turning from outer expression of situations to inner – perception of dynamics of the situation and specific its interpretation – that is turning to understanding stimulating factors of activities of individuals. The change took place in the works of D. Magnusson [21], R. Nisbet

& L. Rose [26] pointing out that strong stress situations may be considered as something extreme and special in everyday and professional activities. Such situations certainly happen in maritime – especially at the moments when the ship or its crew have been endangered, especially at the sea. From what has been said we can build up the following model of research pointing out:

research aim – theoretical analysis of contents of the seafarer`s personality;

research object – activation of the personality of the seafarer as the determining feature of the choice of the model of conduct;

research subject – psychological patterns of seafarers functioning actuality of research may be explained by the fact that up to now in Latvia we do not have any research about the structure of seafarer`s personality and consequently, we lack prognostic psychological analyses of its restructuration.

From the aim of investigation we can draw the following tasks:

1. To acquise and analyse literature relevant to the subject;

2. To describe personality as social relations and action motivations resulting dynamic structure;

3. To reach prognostic analyses of dynamics of activation as characteristics of the seafarer`s personality.

Methods at work: monitoring, content analysis, qualitative analysis. Theoretical-methodological bases of research – D. Fiske's and S. Maddi's [14] approach to activation of the body.

To ease the analysis of the problem we suggest to use the paradigm of three elements as follows:

1. element – seafarer before taking need to act/before activities (it is characteristic or usual activation level) with competences, abilities and needs sufficient to adequately react. Emerging from his usual environment – from his family to the ship he starts establishing contacts with other crew members. This is time when changes in the seafarer`s conduct may be observed due to establishing successful adaptation in new microenvironment and relationship with other peoples. This shows to changes in the emotionally affective component of the seafarer`s personality and his motivation. He develops a more differentiated attitude towards his surroundings and himself. These changes signal to the fact that he has reconstructed himself into „self-real" and „self-ideal", as well as „I in the past" and „I in the future" in the line of scheme of mutual relations. To put it simpler: he has been changed because has come on ship where trifles and inattention should not take any place.

When analysing the personality on board the ship, the seafarer has to be analysed as a psychological and at the same time – purposeful system. To understand it better, we may use concepts of R.Cattel [8] who suggests characterising the personality depending on how alert the given individual is to the world around him. His concept analyses the personality as "reflective of the real world phenomenon".

2. element – making decision and activation to carry out particular tasks (actual activation level), as well as the motivation which comes from the fact that the individual has to be on the ship, it is his duty and along side with it, he finds himself in use on less closed circumstances with the environment of many restrictions to his individual needs. The seafarer has the possibility according to limited circumstances of the ship at sea to realize his psychological, as well as, only partly - needs to stay safe. He may be unconscissions of that – the seafarer on ship is constantly in a stress situation and according to different outer circumstances on the way of the ship the level of stress may be intensified or reduced without much certainty. It works on sympathetic nervous system and neurological and biochemical processes in the body, stimulate the feeling of uncertainty. In everyday life it tells upon the person as subsensory feeling of constant situative restlessness.

3. element – the seafarer after the action (actual or usual activation level), gratitude, deescalation. The level of activation returns to the usual level or is circled in the actual level.

Personality is a complicated psychological basic category which allows the man to answer the question which he puts to himself: "What am I doing and why am I doing it like that?" To answer these questions, man tries to preserve his everyday usual, characteristic for himself activation level. Activation is the term which designates energy, dinamism, initiative in the human body as a changing system and helps to explain its influence on human conduct. This system in its way is stimulating and functionally in psychosomatic processes it may be called also by the term – influence. When discribing its stimulus reactive factor it may be recognized by its three criteria: intensity, essentiality and variety. Activation level is direct function of influence, that is stimulator of individual`s activity [14].

From what has been said we can deduce the main question discussed in this paper: "Is activation of a personality necessary: will it promote fulfilling of seafarer`s functional duties?" Apriori it might be accepted that seafarers on board a ship every day communicate with other people, show their interests about what is going on in their microenvironment. He is healthy psyshosomatically, social control and microenvironment stimulate his body homeostatically and, as a minimum, excites in him feeling of

gratitude for good sound health, meeting of his needs on the ship, as well as feeling safe and out of danger.

S. Maddi define personality as a complex of motives and other features. It is essential for the individual to keep up his characteristic level of activation. If it drops, the individual starts using his energy resource, but if it climbs – he starts reducing energy. The usual activation level is formed at the beginning of piling up his experience. If the level is high, person wants to be intensive, active, reflective of stimulae; if it is low – person starts taking distance from stimulating things or becomes neutral to them. Highly activated personality looks for contact in social surroundings, while – personality with low activation – will try to get out of the contact with them. Highly activated personality will try to get through difficult situations not withstanding restlessness and danger – he will never he at a loss [19].

There several approaches to determine seafarer`s professionalization. What they have in common – there are two following criteria:

1. the individual is a biological system and we should activate his personality's organic part at work;
2. the individual is a socially psychological system.

In the first instance, priority would be given to methods which activate body, as well as normalize psychological structure, which means inside (intra – level) work. It will he very important in the submarines. The USA Military Fleet has declared somatic and situative stress with their crews. Some body processes get stimulated. It has been found by collecting seliva and other proofs of work of the body when working in the submarines, also excess production of cortizon which appears at stress situation. Ecological stressors get at work in under – water situation. It might even be componed with the situation which emerges in prison conditions. State of health of the individual on the whole is dependent on the aims in life the man has and his ability to ungergo concrete stress situations, as well as ability to receive qualified social and psychological support. Nevertheless, in submarine regime their support is limited. Seafarers in these situations suffer from high blood pressure, depression etc. [31]. There are rare cases when psychological and clerical support is given in Military Fleet, but Civil Fleet goes without it even nowadays.

In the second instance, to maintain good consolidation of the crew, social processes should be accentuated and individuality, in this case, receives the role of a second hand element. Work is done on the "inter - level" and today it dominates in navigation for developing professional and social relations. Conduct for limited circumstances on board the ship has polar contents. It may he passive or active depending particular maritime standards. Passive model is dominating due to limitedspace on the ship. The seafarer`s psychic or physical potential might be put at work when in extreme situations. Confidentiality, stress, nostalgia get activated, limited physical exercise tells upon the conduct of the seafarers that are characteristic to persons working in limited space.

Compatiability with other people on board of the ship is essential already from the very start when the man comes on the ship. Compatiability characterizes mutual bihaviour of two indivials. We do not have united theory of compatiability at present, still, Lithuanian scientist A. Augustinaviciute [39] presents the concept of Socioniks based on the classification of individuals according to their social type. Thus, we can prognosticate the cooperation of certain people. She points out 16 such types concerning navigation with 8 mutually adequite pairs. The paradigm concerns limited space and long cooperation of people. It concerns forming of submarine crews, as well as ship crews at sea, especially in the situation of dangerous weather conditions. The scientist comparer the man with the engine which user and exchanges energy in the stage of work. Augustinavichute analyses the control concept of her teaching – that is the man himself, with his informative metabolism thruegh wich he receives his information about: 1) potential energy of the subject being monitored, his psyche and physical stale; 2) mood and emotional stale; 3) ability to get activated, his will and motivation. We all perceive the real world in an individual way. Still in subject – subject interrelation what matters - is not only activity, but also mutural psychosemantic coinsidence with attitude towards common objects and processes [38; 40].

What has been said before is important in navigation. Processes which are at work and are developed during navigation develop the individuality of the seafarer, as well as make him conscious of his being a part of the crew. Adaptation is an important factor for a seafarer – adds activation and motivation. On the contrary – adaptation difficulties nagatively tell upon the cooperation processes on board the ship – safety of the crew, cargo, ability to react in difficult situations.

According to the autor of the notion of effectiveness of collectice potential A. Bandura [5], this effectiveness depends on what people are working in the group; why, what and how large is the effect to carry out the task, as well as what intensity challenges should there be to dissolve effective cooperation. It all shows to the fact that seafarers should be hidly motivated with a high level of activation, as well as how steady they are to be in pressing circumstances on the ship at sea.work at sea depends on geophysical

changes. In the 20th century P. V. de la Blashe and E. de Martone [36] developed the so called concept of the man`s geography. The object of this study was the process on the Earth and influences of meteorological changes upon the man and his activities in social space and in nature. The USSR scientist A. Chizevsky [44] started helioteraxical concept, where cosmic proceses and their influence upon people are investigated. Concretely – the influence of the Sun upon reactivity of the man`s nervous system and upon agression of population in general [41].

Recently the paradigm of warning up of the Earth and the consequent changes in its climats has been developed. We speak also much about the Moon phases and their influence upon the activities of a man. Popular nowadays is the concept of USA psychologists U. Bronfenbrenner [7] about ecology of man; as well as U. Neisser`s [25] self-ecology concept.

Accordingly, we offer two directions of the seafarer`s individuality activation problem discussion:

1. Socially – biological, that is, micro and macro environment in which the seafarer finds himself when he fulfills his functional duties, also changes in which take places in the result of it – changes in space and neuro humoral regulation system of the man. What matters in the case – is the management aspect, the professional capacity of the sea captain - his professional capacity which shows his ability or disability in this work, his skills to take care of the work regime and necessary work conditions.

2. Psychological investigations which mean analyses of changes in the seafarers personality after interchange with working and life conditions on board the ship. This matters in our research in this context of the suggested third paradigm`s element.

Retrospective analysis of the contents of the sefarer`s personality

Basing on the objectives of our investigation, as well as question number two, let us stop at two aspects of structuring and development of the seafarer`s personality – characterizing and intellectual.

Characterizing aspect means that in different real life situations different people react in different ways. Because of these differences in their reaction, people are differentiated according to their characters, attitudes and dispositions. H. Eysenck [13], V. Norman [27] at the highest level of generalisation of chahacterising aspect suggest three integrative factors: extraversive – introversive; positiveness – antagonism; emotion stability – unstability. Others – J. Digman and J. Inouye [10], as well as V. Norman [27] suggest also other factors, such as: domination – being dominated by somebody; consciousness – unconsciousness; culturaly educated – uneducated. As these dihotomies refer to everyday life, there is no recessity to discuss them in greater details. When dividing these integration factors in smaller segments and shifting them to a lower level, we get at the traditional features of personality, such as e.g. extraversy (opposite to intraversy), talkativeness (opposite misantrophy), being courageous (opposite to being cautious), open heartedness (opposite to being secluded) etc.

S. and H. Kreitlers [30] have come with interesting suggestions, which to full extent may be referred to seafarers, too:

1) pesonality as a system and the main principles of its formation;
2) the factors which influence personality transformation;
3) social support, carrying it out and the social support instruments;
4) extension of the cognative sphere and the result of it, which might be either social risk or moral and disciplined seafarer as a positive alternative.

Other authors D. Katz & R. Shark [28] suggest the idea to analyse personality together with different other psychological notions. G.Allport [4] invites us to consider personality as a unique criterion of an individual. His treatment of the problem is close to humane approach to personality nowadays and takes into consideration question about human right and their application in seafaring.

The personality of the seafarer has been formed in rapport with circumstances at which the person has the choice to choose his activities, be effective reach the result according to his own aims, as well as, common aims of the ship crews. There does not exist one common definition of the personality, and therefere when dealing with the seafarer`s psychological problems, let us stop at G. Allport suggested version about the personality as an organised system functioning aso ne whole on the complex of skills, attitude and feeelings which characterize a member of some group as being different from other members.

G. Murphy already in 1947 [24] understood the role of environment and concrete situation in characterising personality. He considered that a man is in the way the situation demands and allows, because in this way – according to the concrete situation – he is fullfiling his social role by means of his personality. L. Klages [29] offers to divide personality into following component parts: matter, structure, driving power. When doing analyses in the personology directions, the author of the present investigation offers to use wholistic approach reducing it to the cluster and environment of navigation.

In Psychoanalytic approch dominates opinion about personality as a psyshoenergetic construction in which psychic illness stimulates restructurisation in the negative direction. S. Freyd [15] saw psychotrauma as reactive stade explain the energetic bases of activation as "Something" functioning in the subconsiouness. Not to reduce energy in everyday situations and in psychotraumatic situation, this "something" actualyzes some concrete instinct. In extreme situations on board the ship, it usually is the "Instinct of surviving". The instinct guards the individual against discharging of energy and allows person to adopt well to the the situation and/or finish job which has been started. By interchange with outer world, "Something" turns into "Ego" and makes move stable the seafarer`s subjektive experience adoling to it more material for consideration. Experienced seafarers have greater subjective experience material because they have had possibility to experience and watch such processes carried till their logical end. It has also been important to them to experience how others cope with such situations. In this may real experience and cognition are improved. The seafarer who has little experience in changing situations is more stressful and this explains why more experienced seafarers are more stable and neutral against neurotic factors which take place when the ship is at sea.

K. Horney [18] characterizes neurotic types of personality (aggresive, agreeing, distanced), shows the factors which influence them more and thinks that restructurization of personality is influenced by unconscious conflicts which constantly are activeted by neurotic processes. They make adaptation at sea and on the coast more difficult. They develop a feeling of discomfort and during the day may work to processes typical at "professional burning out". Here we can speak also about addicts.

A. Adler [1; 2] is convinced that activities by the individual always are purposeful, but warns us that deep aims and motivation for action is known only to the man himself. Personality cooperates with other people and belongs to some socium. Social instinct motivates the seafarer and still primarily he is individualistic. When working in group he devoles his effect to safety of the ship and helps to keep it up as well as only he can, because group interests take upper hand, especially when the ship is at sea.

According to age, professionalization of the seafarer has its specific features. At any stage crises of personality are possibile. According to E. Erikson [11] crises are challenge for any individual person before real difficulties of life. Anyone who wins over the crises, retains new psychological strenght and obtains skills, develops his own image and becomes more worth for the society. This is essential for seafarers and is connected with learning practical skills and ability to adopt themselves in extreme and traumatic circumstances.

H. S. Sullivan [32] expressed views about human personality alike K. Horney. He is the author of interpersonal theory. This theory does not negotiate biological personal constitution and its inborn feature in the characteristics of personality. He accentuates specific feature of a man as the product of socialization. According to H. S. Sullivan the structure and even physiological functions of people emerge only in the result of social contacts and are formated in some concrete culture or subculture, navigation for example. Sullivan thinks that a man exists in asocial sphere and his activities are connected not only with real and situative persons, but also with imaginative. The personality should be analysed together with the context of situation. H. S. Sullivan`s view is in rapport with a popular, but false thought about little meaning of situative factors, which is used sometimes even in the process of evaluating personlity conduct. This flaw has been known in social psychology as "fundamental mistake of attribution" (L. Ross, 1977; R. Nisbet & L.Ross, 1980; E. R. Jones, 1979; D. T. Gilbert & E. E. Jons, 1986, also L. Ross & R. Nisbet, 1991).

According to H. S. Sullivan [32], at the bases of man`s activity is personification which is common image of a concrete person, his communication partners and his environment. It is based on immagination which adds to positive emotions if the cooperation has been positive. If negative was dominating in the interchange with the subject, then destructive features in the psychophysiology of an individual get more expressed. This means that personification helps to establish mutual relations and put in order microinvironment which is essential for a seafarer when on board the ship. Sullivan considers that any act of person`s energy application is important for him in the dynamic aspect of restructuration of a person and essential role in it has "Self-system". This system has to act as alarm reducing factor, still in reality often it does not happen. For example, visible alarm symptoms in the actions of the ship captain, his nervousness at fire disaster, poisonous stuff extension or other extraordinary situations, usually get over to the crew members, especially those who are functionally close to him, if the managment regulations foresee captain`s constant being on the command lodge.

There is a view in *humanistic approach* that during doing his professional duties the seafarer lives in the professional reality characterised by low aspects of his psychic conditions:

1) reality which is perceived by the seafarer with his sense – "the sensory wourld", which is interpreted with the help of his experience;

2) subsensory reality which the seafarer is not able to interpret with the help of his outer experience – "perceived by senses but not interpreted accordingly because of the weak starting stimulies".

It goes like this: when there exist neurotic tendences and he wants to isolate himself, then these two worlds or realities are different and grantly influence the seafarer`s "self-concept".

I. Kon [43] as the system of socially tendered features consisting of three constructs: emotional (negative or positive constitute the phone of person`s emotiveness); concuctive (characterized by ability and wish to be active); cognitive (all information about oneself).

R. A. Mc Clearly and R. S. Lazarus [23] claim that when human body reacts towards alarm in a subsensory way physiological changes take place in it - for example, inabilities of sleep, sweating, tremor etc. When negative factors are at work, the seafarer develops false images about being endangered from others and he developds negative attitude towards them. Seafarer like this, especially officer is destructive to the team because his personlity situatively and constantly is represented as neurotic. E.g. nervous, neurotic captain is a big problem on board the ship. He generates nervousness and feeling of insafety also in other seafarers, sometime even endangering positive work and does not ensure seafarer`s needs which is at the bases of A. Maslow`s hierarchy model of needs [22] (the two lowed lewels), K. Alderfer [3] in ERG (existence-relatedness-growth) model shifts it to primary or existential needs. Psychophysical and needs for safety is the minimum which should be ensured for the seafarers.

The original view has been offered by G. Allport. He considers personality as a proprium: whole system. Still he thinks that personalities have feature which might also be the main driving forces for the concrete personalities. Development is the form of being for personality while the personality is in its process of existence [4]. Similar approach is held by other representative of this trend. H. Eysenck [12] and R. Cattell [9] consider that any individual because of this predisposition (because of the sum of certain factors) in different situations may have typical reactions, but when in particular (individual) situations, they will act in different ways. They are no two people alike in the world.

Existential approach is based on the axiom that all of us are exclusive and there is not anybody who can be deeply envolved in the processes of other people`s restructurization. Existentialism is strongly subjective philosophical trend and its representatives R. May [20] and V. Frankl [42] interpret individuality as the stats of constant development during which we should realize our aim of life – we have to live through time given to us in the best possible way. The opposite to life is death, after which there would not be any alarm or the ability to choose. The main terms are existing, alarm, personal sense, death, loneliness. All these characterise also the life of a seafarer, his routine existence and emotional states on board the ship at sea. Still culminating existential features are before the danger of death.

When using existential trend, we can abstract three forms for the seafarer`s existence:

1) he has own subjective/intimate world (Eigenwelt) which is intrasphere in which the person develope his self-assurance, as well as becomes conscious of his resources and needs;

2) he has objective world (Umwelt) which is the intersphere through which he actualizes his interests and needs, as well as he decides to be or not to be isolated from the whole world and all the people;

3) by balancing or disbalancing these two spheres, he finds his essential position of acting towards his microenvironment. Accordingly, the person finds himself also in the common world or Mitwelt, where he is able to realize (or not realize) all his potential and where he lives locally (an egoist) or globally (socially active type) with a high self-effectiveness. This high self-effectiveness is connected with waiting for success and it serves to him as a positive result in his actions and all this makes higher his own self esteem, If self - effectiveness is low – he waits for a bad chance – self esteem usually gets lower. Growth of self-effectivity usually is stimulated by cognitive skills which add to his experience and sometimes acts as autosuggestion – keeping positive – which is important in the life of seafarer.

Ability to act is composed by objective and subjective factors. Objective factors and their totality is formed from moments of reality which can be influenced by a man only minimally. The totality of subjective factors is made up by the contents of 'self-image'. E.g. J.Rotter calls them 'locus of control' which is constantly changing. Thus people who think that their good and bad features in life are predisponed only by their own abilities and actions – the subjective potential, are orientated to 'iner' censorship and they are keen to influence stimuli. They belong to 'internals'. Another group of people considers, that success and failure is influenced by outer factors – fatality, other subjects. These people do not try to foster and influence the run of things, they give themselves up to forces of fortune. They belong to 'externals' and J.Rotter is considering that they belong to people who have low ability to adapt. They feel themselves worse in disordinary situations [35].

There also is one psychodiagnostical problem which is connected to specific factors of the work of the nervous system. This means that during the work trip, being in closed environment for a long time,

seafarers suffer from decompensation and hypocompensation. Under these states the seafarers may overcome code of conduct of the ship, sometimes they may become aggressive and react inadequately to almost every stimulus. They show the tendencies of becoming addictive, especially after the end of the routine course. After the trip they lose discipline and control, lower their social responsibility.

Insight into the problem of seafarer`s activation

It has been known that activity is correllated with mood and state of health of a man, usual activation level for a body and is correlated with it's functional states. For a specific man usual everyday activation level is a typical feature. Working in the sea for a long time, the seafarer may have situations when the intensity of stimulus becomes less. He has certain experience how to prognosticate the situation and events. To keep up with constant usual body conditions he has to be active enough when being at the sea.

If we want to answer to questions Number 3 – activation is a neuropsychological notion. In the body – in human brains – any man has his own individual homostatistic disposition where the norm is higher than the minimum but lower than the maximum [14]. Because of this, person tries to keep his activity level in the usual diapason. Activities in navigation are selective because they depend on time of the day, weather, cooperation with other people, subjective aims, the result achieved and thus, during life and work, the system of activation becomes rountinated, person acts according to certain routine. Low reactive personality seafarers do not take on additional safeguarging to be effective enough in their basic work or does it only a litte. They have equilibrium between main and subjugated actions or even may have small overweight of the subjective actuality of main action. High reactive personality seafarers have overweight for subjugated actions because they help to abstract and get distanced from different stress situations in which highly reactive individuals have lower capacity for work. The captain preferably should to be the first type individual.

Differences between high and low reactive seafarers types at different stimulation levels indicate to effectiveness of action and, moreso, in psychophysiological changes, i.e. in fulfilling tasks and reacting towards the real situation. This means that in little-stimulating situation the high reactive seafarers should have less psychophysiological changes, because thankfully to their mechanism of stimulation, which have few stimuli, the situation with the little stimulation would be more appropriate to them in comparision with low reactive people. And vice versa – situation with large stimulation – will be more appropriate to low reactive seafarers. If this is not taken into account on ship – neurotic and psychic processes in seafarers conduct may grow.

Any seafarers is a teleological, motivated system. High motivation on board of the ship may be ensured by followingsubjective and objective condition (at the condition when their proportions are optimal for a particular seafarer). They are:

1) subjective – state of health, being ready for his job, experience;
2) objective – conditions of life on board of the ship, psychological climate on the ship, specific trends of doing necessary work, physical and emotional load, watchmanship graphics, weather and navigation situation, specific cargo.

According to the universal account of seafarer`s functions, we can judge that person on ship gets used to unchanging sea situation, but if he had to be for a long time in unusual circumstances, change of activation may take place. After the voyage, many seafarers become passive, when they usual activation level gets to the usual place. It may excite psychosomatic diseases which are characteristic for them when at coast condition. They may cultivate unhealtly lifestyle, become addictive. You may tell about all it when watching them – their body transformations, gait, speed, expression, becoming ill ofen, being tired; they may have had breathing issues, etc.

The elements neccesary for good work on ship for seafarers in the „self-concept" would be:

- in the emotional component parts - good attitude towards oneself, high esteem for others, emotional balance, inner tranquility;
- in the conduct component part – rational activity, tolerant communication, working in group;
- in the cognitive component part – balance between „self-real" and „self-ideal", adequate self-assessment, positive view for future on the ship and at home.

These personality structure elements get systematized in „self-concept" and depending on the sphere were he acts in concrete time, as well as situative conditions and environment at this moment , „self-concept" for a concrete person gets actualised as „self-real". Before his mision at sea (at home, in the family) and during work at sea „self-real" gets differentiated. The first gets deactualised when being on

the ship. Also psychologically the seafarer gets adapted to the sea circumstances. The seafarer`s „self-concept" on ship has all three paradigm elements and develops as an unlinear dynamic system.

According to V. Atkinson (Atkinson, 1995) we are constantly influenced by our thoughts. Our thinking tells about our "Ego". The Bible said: „What a man thinks in his heart – shows his real essence". The person with high energy potential in his thoughts will have high potential also in his physical and psychological activities. The man who decides that he can do something will actualise his dreams and intentions in life. On the other hand, the person who thinks that he cannot do anything, will be passive and inert in his activities. Good thoughts attract positive actions; bad thoughts repell them [37].

Conclusions

We have dealt will all three questions posed at the beginning of the article. We have studied literature, analyzed it and, on the bases of it, we have drawn conclusion. In the second and third points we have proved that personality is a complicated, dynamic system with changing contents. To fulfill functional duties, especially in extreme situations, it is necessary to activate personality and mobilise the resources of his body.

Thus, we have answered to the main question about activation and its essence. We treat it as an obligatory body stimulating neurological function, which stimulates quick understanding and accordingly reacting directly towards normalisation arising from disproportions, especially in case of deficit situations, when we do not have enough time or resources to deal with the necessary tasks in an appropriate arising situation. In the situations with slow dynamics and good time resources, with the reserve of materials, activisation is not obligatory, and much depends on the seafarer`s motivation to do something in a shorter time.

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SUBSTANDARD SHIPS AS A THREAT TO THE ADRIATIC SEA BIODIVERSITY

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Abstract
As a semi-enclosed sea with low tides and slow water exchange the Adriatic Sea is highly sensitive to pollution. Its rich ecosystem, which includes many unique, rare, and endangered species, is exposed to numerous anthropogenic pressures, resulting with the causes of biodiversity loss such as habitat degradation, excessive nutrient loads, heavy metals contamination and plastic pollution. Maritime transport poses a significant risk to the environment and it is necessary that all stakeholders take measures to ensure safe and environmentally friendly ship operations. The Port state control (PSC) protects marine environment by identifying and eliminating substandard ships. We analyse deficiencies related to the pollution prevention that were marked as a ground for detention of ships inspected in Italian, Croatian and Slovenian ports in the period from 1 January 2015 until 31 December 2017 to detect which issues most commonly arise and to propose corresponding measures.
Keywords: *biodiversity, sea, ships.*

Introduction

The Adriatic Sea is a narrow (an average width of approximately 170 km), shallow (an average depth of 252 m), relatively small (138,600 km^2), elongated semi-enclosed sea within the Mediterranean Sea (Cushman-Roisin et al., 2013). A distinct combination of geographic, bathymetric, orographic and climatic characteristics makes it a marine biodiversity hot spot, with more than 7000 species, with a large proportion of endemic species (Coll et al., 2010; Templado, 2014). However, due to its characteristics it is peculiarly vulnerable to pollution. Unfortunately, like the rest of the Mediterranean Sea, the Adriatic Sea is exposed to the significant pressures from numerous driving forces including population growth, coastal development, fishing and aquaculture, tourism, agriculture, industry and traffic. Habitat loss and degradation, pollution, eutrophication, over-exploitation, species introduction, seawater warming and acidification act individually and synergistically and alter its biodiversity.

Approximately 7500 vessels enter and leave Adriatic ports transporting 75 million tons of hazardous and noxious substances and about 180,000 boats and yachts sail in the Adriatic annually ("Fight Against the Pollution of Adriatic," n.d.). Therefore it is not surprising that this intense marine traffic contributes significantly to the deterioration in environmental quality of the Adriatic Sea, one of the most polluted seas in the world. To prevent, reduce and control ship-source pollution it is necessary to implement all available measures by various stakeholders.

The role of the Port State control (PSC) is to ensure that foreign-flagged ships are in compliance with the requirements of the international conventions. Inspection of ships are undertaken by the PSC officers (PSCO), who collect information, scrutinise documents and through visual observation and beside other issues ascertain whether there is a risk of pollution of the sea. In cases of significant non-compliance ships are detained.

It has been widely acknowledged that the PSC inspections contribute to the improving the safety level of maritime transport (Li and Zheng, 2008). Research shows that PSC inspections result with significant reduction in the number of deficiencies (Cariou et al., 2008). An analysis of detainable deficiencies can provide information on the most serious problems related to ship-source pollution and identify current risks to the Adriatic Sea imposed by substandard ships. Additionally, it can help ship owners, managers and operators to recognise problems leading to ship detentions and develop and

implement appropriate measures. Therefore we look into detainable deficiencies with respect to the deficiency risk area, defective items, ship type and age and flag State.

Analysis of detainable deficiencies

To assess current problems related to pollution of the Adriatic Sea by substandard ships the Paris MoU Database THETIS is surveyed ("Inspection Search | Paris MoU," n.d.). The targeting of ships for inspection is based on a Ship Risk Profile, recalculated daily and dependent on generic (type and age of ships, performance of ship's flag, performance of the recognised organisation, performance of the company that is holder of Document of Compliance) and historic (number of deficiencies, number of detentions) parameters ("Ship Risk Profile | Paris MoU," n.d.). In the period from 1 January 2015 until 31 December 2017 1499 inspections were executed in Italian, Slovenian and Croatian Adriatic ports. As a result of inspections 130 detentions (8.7 %) occurred. In 63 occasions ships that were detained had deficiencies related to the pollution prevention (49 %), and during 24 inspections deficiencies related to the pollution prevention were marked as a ground for a detention (19 %). There were not detentions based solely on the pollution prevention-related deficiencies.

Observed 104 deficiencies were related to 20 items (Table 1). They were most frequently recorded in the area Certificates & Documentation - Ship Certificate (53 %) followed by the area Pollution Prevention - MARPOL Annex I (28 %). As can be seen in Table 1, deficiencies related to the oil pollution prevention prevail (68 %). Detainable deficiencies (26%) were related to 11 items. They were most frequently recorded in the area Pollution Prevention - MARPOL Annex I (67 %) followed by the area Certificates & Documentation - Ship Certificate (19%). Again deficiencies related to the oil pollution prevention prevail (74 %), particularly those regarding oil filtering. These results indicate that substandard ships impose a significant risk related to the oil pollution, especially since consequences of oil spills to the economics of port States, with a large share of tourism and fisheries, could be pronounced. Unfortunately, a number of oil spill monitoring have detected many large oil slicks and demonstrated constant violation of Annex I in the Adriatic Sea (Morovic et al., 2015).

Table 1. The pollution prevention-related deficiencies recorded on detained ships in the Adriatic Italian, Croatian and Slovenian ports, 1 January 2015 until 31 December 2017

Deficiency area		**Total number of deficiencies with remarks**	**Number of deficiencies marked as a ground for detention with remarks, percentage of total number**
01 Certificates & Documentation			
011 - Certificates & Documentation - Ship Certificate			
1117	International Oil Pollution Prevention (IOPP)	5 (not properly filled, entries missing)	1 (invalid), 20 %
1119	International Sewage Pollution Prevention Cert.	1	1 (invalid), 100 %
1124	International Air Pollution Prevention Cert	3 (not properly filled)	2 (invalid, missing), 67 %
013 - Certificates and Documentation – Document			
1314	Shipboard oil pollution emergency plan (SOPEP)	19 (entries missing, not updated, not as required)	1 (incorrect), 5 %
1315	Oil record book	19 (entries missing, not properly filled not as required, incorrect)	-
1320	Garbage record book	6 (entries missing, not as required, incorrect)	-
14 - Pollution Prevention			

141 - Pollution Prevention - MARPOL Annex I			
14102	Retention of oil on board	3 (not as required)	-
14104	Oil filtering equipment	11 (not as required, documentation missing)	8 (not properly maintained, inoperable, documentation missing), 73 %
14108	15 PPM alarm arrangements	8 (inoperative)	6 (inoperative, not properly tested), 75 %
14119	Oil and oily mixtures from machinery spaces	3 (lack of familiarity)	2 (lack of familiarity), 67 %
14121	Suspected of discharge violation	2	2, 100 %
14199	Other (MARPOL Annex I)	1	-
144 - Pollution Prevention - MARPOL Annex IV			
14402	Sewage treatment plan	1 (not as required)	-
14404	Sewage discharge connection	1 (not as required)	-
145 - Pollution Prevention - MARPOL Annex V			
14501	Garbage	4 (not as required)	2 (not as required), 50 %
14502	Placards	2 (missing)	1 (missing), 50 %
14503	Garbage management plan	6 (missing, not as required)	-
146 - Pollution Prevention - MARPOL Annex VI			
14604	Bunker delivery notes	1 (not as required)	-
14606	Diesel engine air pollution control	1 (not as required)	-
14610	Operational proc. for engines or equipment	1 (not as required)	-
14611	Ozone depleting substances	6 (documentation missing, not properly filled, not as required, not properly maintained)	1 (not as required), 17 %

Source: authors based on data from the Paris MoU Database https://www.parismou.org/inspection search/inspection-search

Marine litter is a global issue that negatively impact biota and causes direct and indirect economic losses. Furthermore, plastics and associated plasticizers negatively affect human health (Laglbauer et al., 2014). Although the majority of marine litter comes from land, sea-based sources are significant sources of waste in the Adriatic Sea, despite banning waste disposal at sea. Namely, it is difficult to notice violations and often impossible to link garbage items with a particular ship. Consequently, vessels often discharge waste, which accumulate and is present in copious amounts at surface, water column and seabed of the Adriatic Sea (Munari et al., 2016; Pasquini et al., 2016). Therefore it is not surprising that deficiencies related to Annex V are represented with a share of 17% among recorded deficiencies.

Emissions of air pollutants and greenhouse gases from maritime transport in European waters contribute significantly to air pollution (Aksoyoglu et al., 2016; Contini et al., 2012) Research data show that elevated concentrations of particulate matter, ozone, primary and secondary aerosols, nitrogen oxides, sulphur dioxide, polycyclic aromatic hydrocarbons and other harmful substances are present in the areas of intense marine traffic. However, only one detainable deficiency was related to Annex VI was recorded. Furthermore, there were not recorded deficiencies related to Annex II, Annex III, Anti-fouling and Ballast water. Considering that these types of deficiencies were noticed on the ships that were not detained, and the fact that other deficiencies noticed on detained ships were very serious and/or numerous it could be supposed that PSCO did not record all pollution related-deficiencies on detained ships.

A possible damage to the environment depends, among other factors, on the ship type. As can be seen from Table 2, the most prominent are general cargo ships and bulk carriers in both categories, in accordance with the known fact that substandard ships are concentrated in these sectors. The effects of pollution during regular ship operations by those type of ships are not as prominent as for example oil

pollution by oil tanker or sewage pollution by cruisers. However, serious deficiencies related to safety of navigation or structural condition have also been recorded, which indicate that risk of marine accidents involving these ships is high, and in that case the damage to the environment could be significant.

Table 2. Number of detentions with pollution prevention-related deficiencies recorded in the Adriatic Italian, Croatian and Slovenian ports, 1 January 2015 until 31 December 2017, by ship type

Ship type	Number of detentions with deficiencies related to pollution prevention not marked as ground for detention	Number of detentions with deficiencies related to pollution prevention marked as a ground for detection
General cargo	29	12
Bulk carrier	5	5
Container	1	1
Chemical tanker	1	1
Ro-Ro passenger	1	
Oil tanker		1
Special purpose ship	1	
Other special activities		1
Livestock carrier	1	2
Ro-Ro cargo		1

Source: authors based on data from the Paris MoU Database https://www.parismou.org/inspection search/inspection-search

Considering age of the ships (Table 3), the majority of detained ships are older than 20 years (among ships older than 20 years average age of ships with detainable pollution prevention-related deficiencies is 35 years, and age of the ships detained based on other types of deficiencies is 30 years). Therefore targeting of the ships based on age enables identifying ships which pose a risk to the environment. This is in accordance with findings that the age of a ship is one of the most important factor in predicting ship quality (Cariou and Wolff, 2015).

Table 3. Number of detentions with pollution prevention-related deficiencies recorded in the Adriatic Italian, Croatian and Slovenian ports, 1 January 2015 until 31 December 2017 by ship`s age

Ship`s age (years)	Number of detained ships with deficiencies related to pollution prevention not marked as ground for detention	Number of detained ships with deficiencies related to pollution prevention marked as a ground for detection
0-5	-	2
6-10	2	2
11-20	6	2
21-30	10	6
31-40	9	7
>40	3	5

Source: authors based on data from the Paris MoU Database https://www.parismou.org/inspection search/inspection-search

The Paris MoU White, Grey and Black list of flag States is based on the total number of inspections and detentions over a 3-year rolling period for flags with at least 30 inspections in the period ("White, Grey and Black List | Paris MoU," n.d.). It is interesting that 56% of detained ships fly a white listed flag (Table 4), since this data indicate that ships flying quality flags may represent a risk to the environment. One of the possible explanation could be finding that it seems that ships detained or with many deficiencies change flag in order to avoid future inspections (Cariou and Wolff, 2011). Our data on flag State support opinion of Cariou and Wolff (2011) that historical factors should have increased weight when selecting vessels.

As seen from maritime incidents reports enforcement of international maritime legal instruments by the port States and flag States can be difficult (Graziano et al., 2018). This is especially true for pollution prevention. Therefore it is important to implement other measures, like raising awareness about impact of marine pollution. Maritime stakeholders are faced with a challenge to communicate environmental information in a way that will affect onboard practices. It is important to tailor messages to the existing attitudes, values, and perceptions and make them understandable, relevant, and personally important

(Nisbet, 2009). For example, messages focusing on public health consequences resonate more than messages focusing on environmental problems.

Table 4. Number of detentions with pollution prevention-related deficiencies recorded in the Adriatic Italian, Croatian and Slovenian ports, 1 January 2015 until 31 December 2017, by flag State

Flag State	Number of detentions
White list	
Antigua	1
Cyprus	1
Denmark	1
Liberia	2
Malta	3
Panama	20
Russian Federation	4
Turkey	3
Grey list	
Azerbaijan	1
Egypt	1
Lebanon	1
Saint Vincent and the Grenadines	2
Ukraine	2
Black list	
Vanuatu	3
Togo	5
Palau	2
Belize	2
Sierra Leone	2
Comoros	1
Cook Islands	2
Equatorial Guinea	1
Tanzania	2
Saint Kitts and Nevis	1

Source: authors based on data from the Paris MoU Database https://www.parismou.org/inspection search/inspection-search

Conclusions

Human activities affect marine biodiversity substantially. This is particularly true for the Adriatic Sea, where impacts of pollution are pronounced due to its physiographic features. Intense marine traffic contributes to the pollution considerably, even if vessels operate in compliance with international conventions. Therefore substandard ships pose a significant risk to the biodiversity.

The results of our survey show that majority of the recorded violations of international conventions are related to the prevention of pollution by oil and garbage. Old ships, particularly general cargo ships and bulk carriers, are the most likely to record detainable deficiencies related to the pollution prevention. Ships flying quality flags also can pose a risk to the environment.

In addition to the efforts to ensure the effective implementation of international regulations, it is important to find appropriate measures to educate seafarers in order to affect behaviour onboard.

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CALCULATION OF TURNING TRAJECTORY OF VESSEL UNDER THE INFLUENCE OF WIND AND CURRENT

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Abstract
Calculation of turning trajectory of ship under the influence of current and wind is considered. The quick method for determining of position of vessel under influence of current and wind is suggested. Worked out the program for determining position of ship in interim points of turning.
Keywords: *İMO, turning, ballast, position, drift, current, centreline, trajectory, rudder*

Introduction

It is known that when developing the ship's maneuverability characteristics, the test results should be in accordance with IMO recommendations A.601(15) and MSC.137(36) [1]. Tests are conducted under certain conditions. For example in our case for the tanker "Babak" the coditions for carrying out the tests are as follows [2]:

- wind – south-west by beaufort scale force number 1;
- sea about 1;
- visibility-1500 m;
- air temperature - $+24^0$ C
- sea temperature - $+ 18^0$ C
- depth 20-25 m;
- loaded condition – in ballast;
- density of water – 1,000 t/м^3.

However when a vessel proceeding in different navigational condition the values of manoeuvring characteristics will have different values. A vessel can proceed in following navigational conditions [3]:

- shallow and deep water;
- in restricted areas, canals;
- loaded or in ballast condition;
- under the influence of wind and current or under the influence of both .

In this article, we shall consider the effect of wind and current, precisely their account in turning of vessel. Calculate the coordinates of points in turning period.

Organization of a task

For taking into account the manoeuvring characteristic of ship in restricted areas the navigator should control the process of turning [4]. So it is necessary to plot position of vessel in the beginning and in the end of turning. However, plotting the position of ship takes some time and information is overdue [5]. For solution of this problem accelerated ways to determine the position of vessel has to be applied. Even in this case, it is not always possible to get information of location of vessel at the time of turning. This task is becomng more complicated by the precense of wind and current. In solution of such tasks navigators usually determine only coordinate of the beginning point in the turning. In this case safety of vessel will depend on how exactly we calculating values of wind and current.

Solution of task

Calculation of drift angle is obtained by the formula of Demin [6,7]:

$$\alpha_i = \arcsin(-0{,}11 + \sqrt{0{,}0121 + 0{,}69 * \sin q * \frac{S_H}{S_п}[\left(0{,}16\delta_{оп} - 0{,}5 * \frac{T_{ср}}{L}\right) * \frac{W}{V}]^2} \qquad (1)$$

where $S_н$ – area of the projection of the above-water part of the hull on the centreline;
$S_н$ –area of the projection of the underwater part of the hull on the centreline;
$\delta_{оп}$ - block coefficient;
$T_{ср}$ – average draft of the ship;
L – length between perpendiculars.

After calculation of drift angle we can build the trajectory of vessel in turning. For the obtaining of trajectory points, taking into account the influence of the wind, after determining of drift angle, we shall get the coordinates (X_1 , Y_1) (Figure 1).

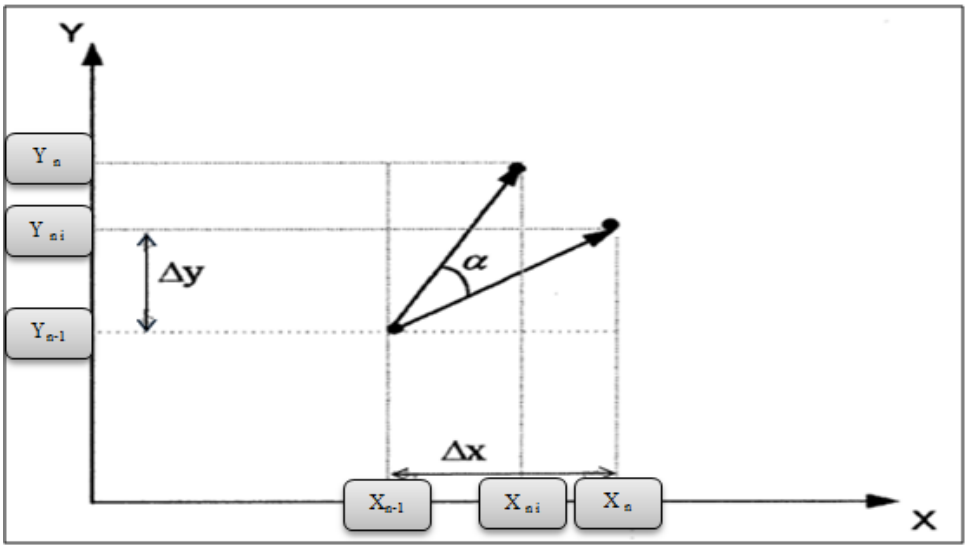

Figure 1. Calculation position of points in turning under the influence of wind

$$X_2 = \Delta X + X_1 \quad (2)$$

$$Y_2 = \Delta Y + Y_1 \quad (3)$$

where $\triangle X$ and $\triangle Y$ – increment of coordinates due to the turning to the angle of drift.

$\triangle X$ and $\triangle Y$ we shall obtain by following formulas:

$$\Delta X_n = (X_{n\,int} - X_{n-1}) * \cos\alpha_1 + (Y_{n\,int} - Y_{n-1}) * \sin\alpha_1 \quad (4)$$

$$\Delta Y_n = (Y_{n\,int} - Y_{n-1}) * \cos\alpha_1 - (X_{n\,int} - X_{n-1}) * \sin\alpha_1 \quad (5)$$

we shall get the values of interim coordinates by following formulas:

$$X_{n\,int} = X_n + \sum_{k=1}^{n-1}(X_k - X_{kint}) \quad (6)$$

$$Y_{n\,int} = Y_n + \sum_{k=1}^{n-1}(Y_k - Y_{kint}) \quad (7)$$

we can also obtain angle of drift by the following diagram [7] (Figure 2).

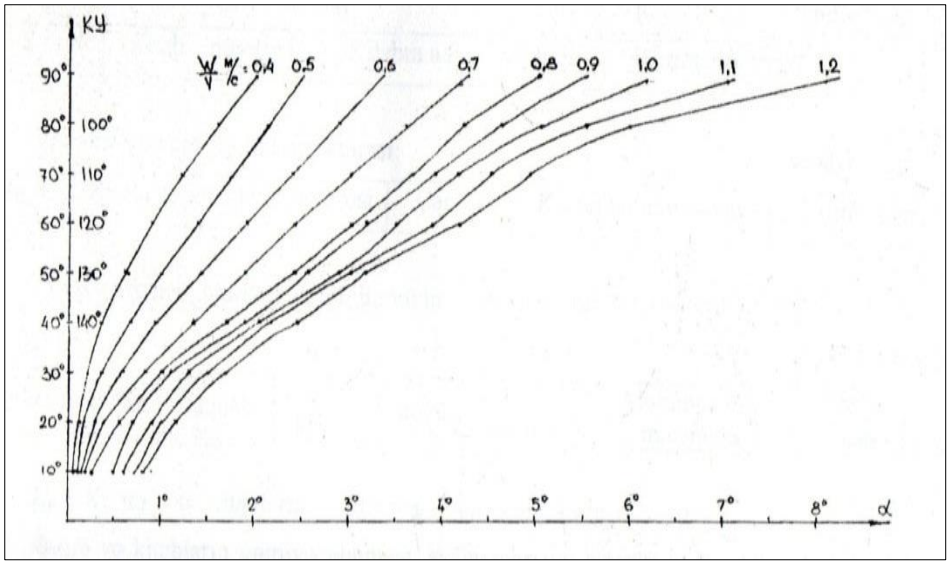

Figure 2. Drift angle determining diagram

For the obtaining points of the trajectory taking into account the effect of current we draw the vector towards set of current in a distance equal to $V_T \bullet \triangle t$ and shall obtain the coordinates of the intermediate points ($X_{int,}$ Y_{int}) (Figure 3) according to the following formulas:

$$X_n = X_{n\,int} + (V_c * \Delta t_n) * sinK_c \quad (8)$$

$$Y_n = Y_{n\,int} + (V_c * \Delta t_n) * cosK_C \quad (9)$$

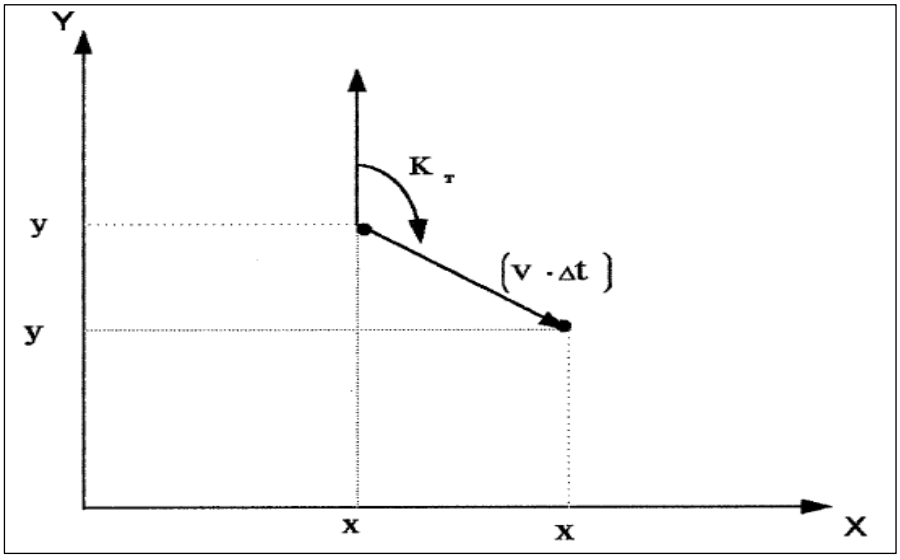

Figure 3. Calculation coordinates of points in turning under the influence of current

(X_{nint}, Y_{nint}) will be determined by formulas:

$$X_{n\,int} = X_n + \sum_{k=1}^{n-1} V_c * \Delta t_k * sinK_C \quad (10)$$

$$Y_{n\,int} = Y + \sum_{k=1}^{n-1} V_c * \Delta t_k * cosK_c \quad (11)$$

Angle of current can also be obtained by the diagram [8] (Figure 4).

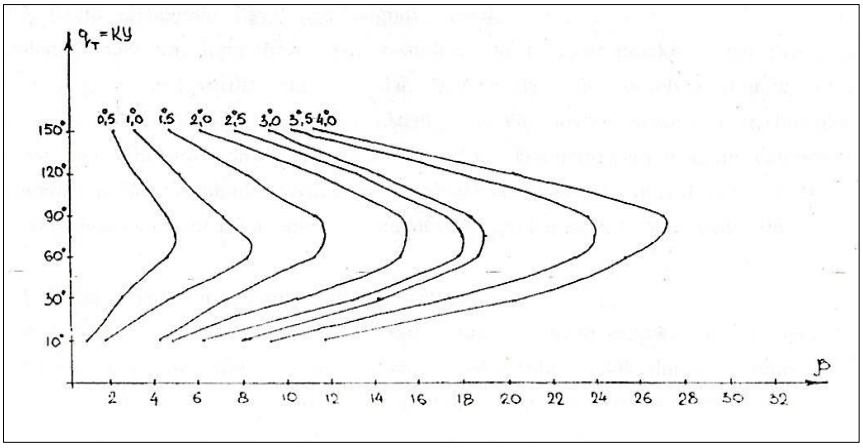

Figure 4. Angle of current determining diagram

For the joint consideration of wind and current we shall determine new coordinates of points in turning:

$$X_{n.wind.} = (\mathrm{X}_{n\,int} - \mathrm{X}_{n-1})cos\alpha_n + (Y_{n\,int} - Y_{n-1.wind.}) * sin\alpha_n + X_{n-1.wind.} \quad (12)$$

$$Y_{n.wind.} = (Y_{n\,int} - Y_{n-1})cos\alpha_n - (\mathrm{X}_{n\,int} - \mathrm{X}_{n-1.wind.}) * sin\alpha_n + Y_{n-1.wind.} \quad (13)$$

Coordinates of interim points taking into consideration the influence of wind we shall determine by following formulas:

$$\mathrm{X}_{n\,int} = \mathrm{X}_n + \sum_{k=1}^{n-1}(X_{k.wind} - X_{kint}) \quad (14)$$

$$Y_{n\,int} = (Y_n + \sum_{k=1}^{n-1}(Y_{k.wind} - Y_{kint}) \quad (15)$$

From the obtained points $X_{n.wind}$ и $Y_{n.wind}$ we shall get to the new points taking into consideration the effect of wind and current by the following formulas:

$$X_{nC} = X_{n.wind} + (V_c * \Delta t_n) * sinK_c \quad (16)$$

$$Y_{nC} = Y_{n.wind} + (V_c * \Delta t_n) * cosK_c \quad (17)$$

We shall consider examples showing the importance of taking into consideration the influence of wind and current during turning process of vessel. This issue becomes more important when it comes to restricted areas. It is known that manoeuvring characteristics of ship are determined in certain conditions of wind, current, sea. A table of manoeuvring characteristics of the ship is drawn up based on these results (Figure 5).

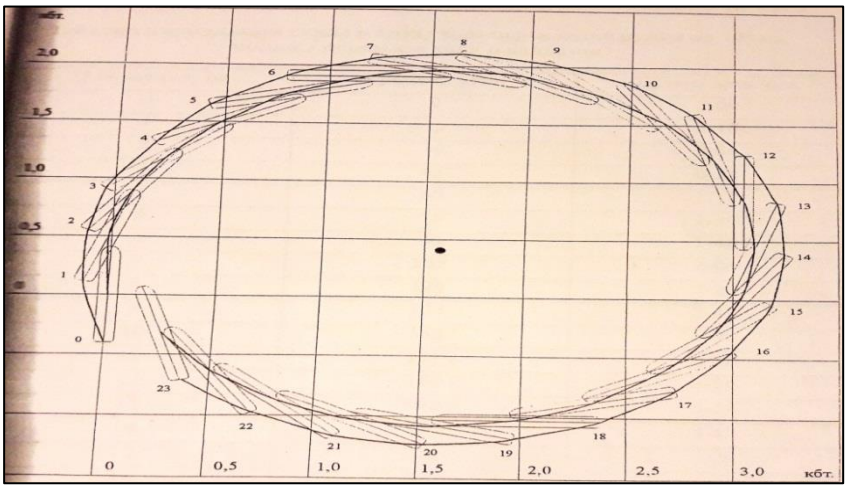

Figure 5. Manoeuvring characteristics of the m/t Babak without effect of wind and current, rudder starboard 10^0 at full speed ahead in ballast condition

As can be seen from the Figure 6, value of tactical diameter is 3 cb and advance is 1,9 cb. These values correspond to the conditions under which tests were conducted to develop a form of manoeuvring characteristics. It is this guidance that navigators use to solve the tasks of passing of vessels in narrow channels.

Navigators are mainly interested in two elements of turning. This is how much distance the ship will go forward to a deviation at 90^0 and at aboard to the 180^0 from initial course. In other words, the value of advance and tactical diameter. If these indicators will allow a safe passing of vessels then he consider the situation is safe. However, depending on the influencing factors given values will vary. These factors are squat, canal effect, current, etc.

To accelerate the process we compiled a program for determining the trajectory of turning under the influence of wind.

Table 1. The determination of the trajectory of turning under the influence of wind

	A	B	C	D	E	F	G	H	I	J	K	N	O	P	Q	R	S	T	U
1	Xn	Yn	ΔXn	ΔYn	XB	YB	θ	qn	VT	KT	Δt	SH	SП	Tcp	L	w	V	δ	αn
2	0	2	-0,01	-2	-0,78805	0,16177	0	15	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	0,4
3	-0,01	0	0,11	0,5	0,1	0,5	15	0	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	0
4	0,1	0,5	0,2	-0,1	0,16761	0,28686	30	15	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	0,8
5	0,3	0,4	0,1	0,8	1,08045	0,19776	45	30	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	1,7
6	0,4	1,2	0,3	0,2	0,27935	0,86023	60	45	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	2,5
7	0,7	1,4	0,1	0,15	0,56499	1,28053	75	60	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	3,4
8	0,8	1,55	0,35	0,15	0,49767	1,78151	90	75	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	4,2
9	1,15	1,7	0,25	0,05	0,89552	1,71555	105	90	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	3,4
10	1,4	1,75	0,2	-0,2	1,12008	1,79053	120	105	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	2,5
11	1,6	1,55	0,1	0,05	1,6367	1,44439	135	120	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	1,7
12	1,7	1,6	0,15	-0,2	1,47115	1,49936	150	135	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	1,8
13	1,85	1,4	0,29	-0,2	1,90857	1,05263	165	150	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	0,8
14	2,14	1,2	0,01	-0,2	2,09045	1,00598	180	165	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	0,3
15	2,15	1	-0,05	-0,3	2,1	0,7	195	180	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	0
16	2,1	0,7	-0,1	-0,2	1,94536	0,53848	210	165	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	0,3
17	2	0,5	-0,2	-0,3	1,64545	0,43446	225	150	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	0,8
18	1,8	0,2	-0,2	-0,2	1,62744	0,4241	240	135	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	1,7
19	1,6	0	0	-0,3	1,42046	0,24034	255	120	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	2,5
20	1,6	-0,3	-0,4	-0,1	2,01227	-0,30554	270	105	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	3,4
21	1,2	-0,4	-0,5	-0,02	1,46256	-0,82598	285	90	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	4,2
22	0,7	-0,42	-0,2	-0,03	0,90103	-0,4421	300	75	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	3,4
23	0,5	-0,45	-0,2	-0,02	0,64826	-0,31428	315	60	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	2,5
24	0,3	-0,47	-0,2	0,27	0,59352	-0,30646	330	45	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	1,7
25	0,1	-0,2	-0,1	0,3	0,24554	0,08075	345	30	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	0,8
26	0	0,1	0	-0,1	-0,02955	0,00447	360	15	1	50	6	503,6	1070,2	7,14	149,9	5	6,53	0,9	0,3

On the basis of given table we shall show the trajectory of m/t Babak (Figure 6 - left picture) where there is no effect of wind and (Figure 6 - right picture) taking into account effect of wind.

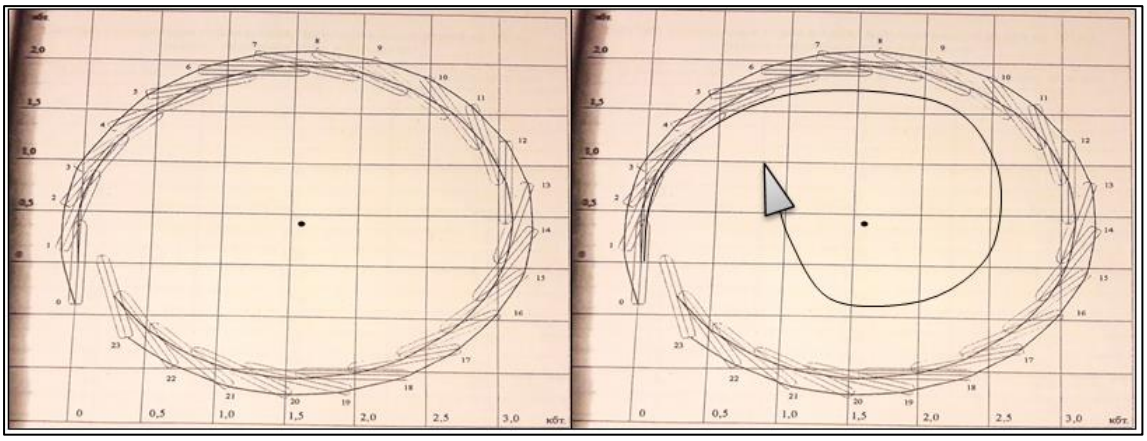

Figure 6. Turning trajectory of the m/t Babak in loaded condition, rudder position 10^0 at a full speed ahead, wind NE 5 m/s

Using above program we shall obtain trajectory of m/t Babak under the influence of both wind and current (Figure 7 and Figure 8).

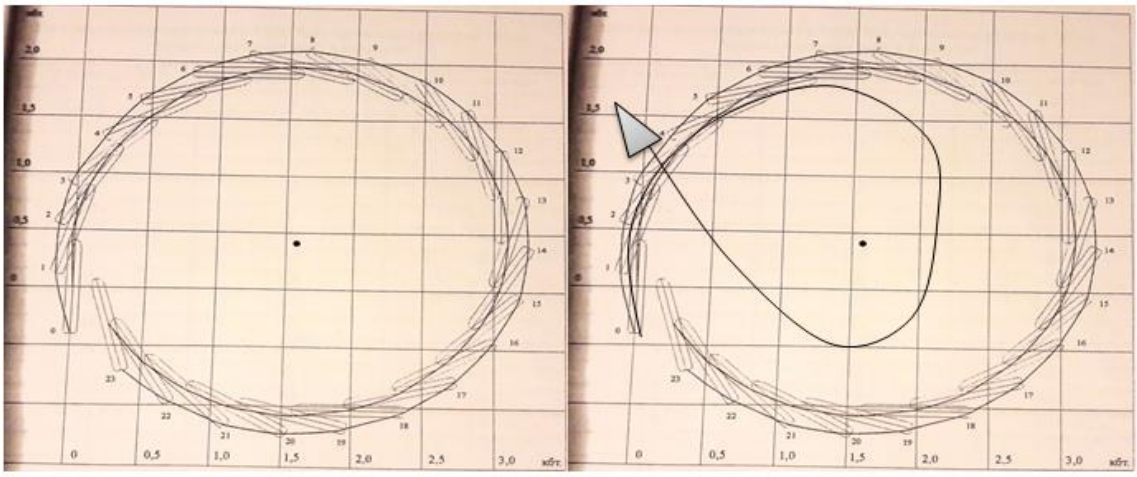

Figure 7. Turning trajectory of m/t Zangazur, rudder position 10^0, at a full speed ahead, speed of current 1kn

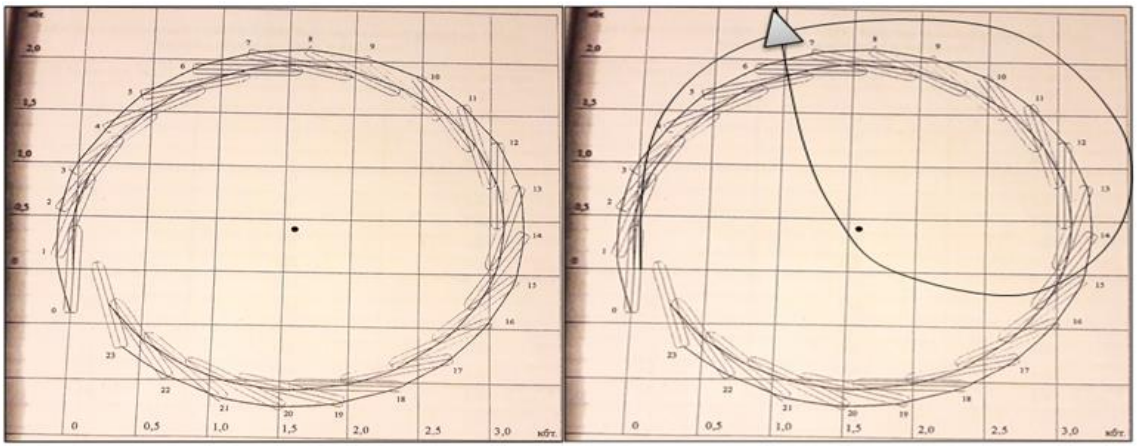

Figure 8. Turning trajectory of the m/t Zangazur, rudder position 10^0 at a full speed ahead, on opposite wind 7m/s, current speed 1kn

Conclusions

The results of the conducted investigations allow us to make following conclusions:
effect of wind on the turn, in the initial period is insignificant in loaded condition;
effect of wind in ballast condition is significant only when vessel makes turning to 90^0 and more.
effect of current on the contrary to the wind, is significant at the beginning of the turn;
combined effect of wind and current character is an advantage of the influence of the current;
to reduce the effect of wind it is necessary for sufficient rudder angles, especially in the restricted areas.
to ensure safe manoeuvring in restricted areas under the influence of wind and current it is necessary to determine coordinates of trajectory points under no effect of wind and current and after taking into consideration their effect if available.

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ORGANIZATIONAL CONCEPTS FOR CATERING SERVICES ON BOARD: A HYPOTHETICAL APPLICATION

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Abstract
Specific maritime professions of marine navigators and marine engineers are traditionally distinguished in science. Researchers often limit their research and they study only the health of seafarers, their professional career and culture on board. However, there is a lack of research of the catering department. The whole life of a seafarer depends on this department, while on board. The catering service is also especially important for passengers. The object of the research is the scientific concepts in organization of catering services on board sea ferries. The goal of the research is to discuss the most important organizational concepts in order to hypothetically apply them to the catering service on board a sea ferry. The main methods such as the heuristic method and an assessment of organizational theories regarding the activities of stewards on board, were used in the research. The linear structure of organizational management, the main feature of which are strict relations between superiority and inferiority, perfectly ensures the control of work performance. The formation of structural units demonstrates exactly, which activities the ship's steward must perform, and coordination, without which employees would not know their role within the organization and would not be pursuing one goal. These factors make it possible to ensure a smooth provision of catering services on board.
Keywords: *catering, services, organization, ferry.*

Introduction

The relevance of the problem. 40% of the European Union's trade belongs to the maritime sector. This sector employs about 4-5 million people [8]. Thus, work at sea has a significant impact on the entirety of the European trade.

Specific maritime professions of marine navigators and marine engineers are traditionally distinguished in science. Researchers often limit their research and study only the health of seafarers, their professional career and culture on board [1; 2; 5; 9; 10; 11; 13]. However, there is a lack of research of the catering department. The whole life of a seafarer depends on this department, while on board. The catering service is also especially important for passengers.

The object of the research is the scientific concepts in organization of catering services on board sea ferries.

The goal of the research is to discuss the most important organizational concepts in order to hypothetically apply them to the catering service on board a sea ferry.

The main methods such as the heuristic method and an assessment of organizational theories regarding the activities of stewards on board, were used in the research.

The type of the research is theoretically descriptive.

Results of the research

Each company establishes its organization principles, using organizational functions, in order the work to be efficient. The essence of the organizational function is to achieve the goals, to streamline activities within a company by choosing and matching the necessary human, material, financial and information resources, working methods, the right place and time [6].

The main structural unit of all organizational work, regarding production, service provision or a combination of these activities, is an operation of work. It is an element of the work process, which is the object of planning, organizing, managing and controlling activities within an organization [7].

The organization of catering services on sea ferries, as in each company, must be organized according to 5 questions - who, what, where, when and how (Figure 1).

Figure 1. Organization as an integrative management function [12]

In this context, the organizational function must be considered as an integration of the organization and its processes of operation into a coherent system. In this case, the organizational function requires to answer the following questions:

– *What needs to be done?* It is necessary to analyze the tasks that need to be addressed, to divide them according to operations that are being performed, methods of execution, exposed (processed) objects; to combine operations, all in accordance with the principle of rationality and purpose at workplaces and its units. The processes have a certain length. They are purposeful and diverse in terms of content (dynamic, repetitive, etc.).
– *Who does what?* The answer to this question can be related to the formation of the organization management structure. The quantitative and qualitative assignment of tasks is addressed to executors vertically and horizontally.
– *Where, when and in what sequence should the task be performed?* Organizational tasks are solved by organizing the process of work in space and time.
– *How?* The answer to this question should be tied to the choice in operating technology selections. The nature of the organization activities (processes and operations) is an essential criterion for the selection of technological measures and operations [12].

In accordance with Figure 1, the possibility is created by integrating management functions into the work of stewards of the ship (Table 1).

Table 1. Management functions integrated into the work of ship stewards

What needs to be done?	Restaurant management: washing the floors, clearing the tables, preparations for other clients.
Who does what?	The duties of each steward are clearly explained, so that the work is done quickly and smoothly: if one is washing the floor, the other is clearing the tables.
In what sequence should the task be performed?	Work consistency is the most important part of the work process; the speed and quality of work depend on it; in this case, the floors should be immediately washed after the tables are cleared in order to allow for them drying before the passengers arrive.
How?	It is necessary to follow strict rules in accordance with the standards of work performance, especially if the work involves using chemicals; this is ensured by the compulsory hygiene skills training.

The basis of an organization is the formation of an appropriate and correct organizational structure. Four steps are necessary for an effective organization of activities, which is typical for catering services on board sea ferries (Figure 2):

– Divide all work into tasks that can be logically and conveniently done by individuals or groups. This is *division of labor*.
– Logically and efficiently combine tasks. The grouping of employees and tasks is usually called *the structural units formation*.

– Establish mechanisms linking all activities into a meaningful whole and control the effectiveness of the combination. This process is called *coordination*.
– Specify who is reporting to whom within the organization. Such use of communication for joining divisions forms a *hierarchy within the organization*.

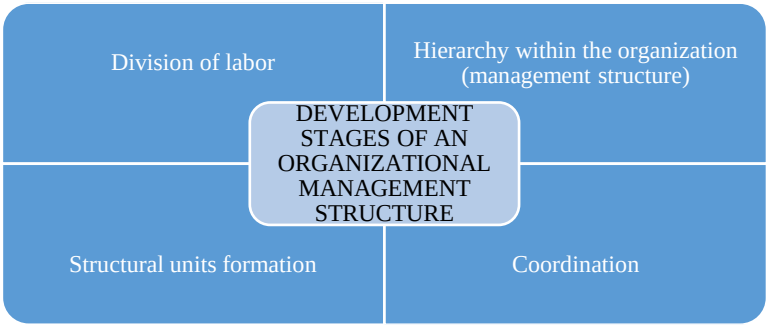

Figure 2. The stages of developing an organizational management structure within a company [3]

These four aspects of organizational work can be considered as the four organizational "building blocks" – components [3].

The division of labor is a complex division of a task into components, so that employees are not responsible for the entire task, but for the individual activities that it comprises. There are two forms of work distribution: vertical and horizontal.

The horizontal division of labor is the division of all work into separate components (operations). At the horizontal level, work can be distinguished according to functional and qualitative characteristics, as well as by the type of production.

The functional division of labor primarily indicates the specialization of employees by field of activity. Separate functions are distinguished and the corresponding employees are assigned to them [3]. The horizontal distribution of work is shown in accordance with one trip on board a ferry, based on the work of four stewards (Figure 3).

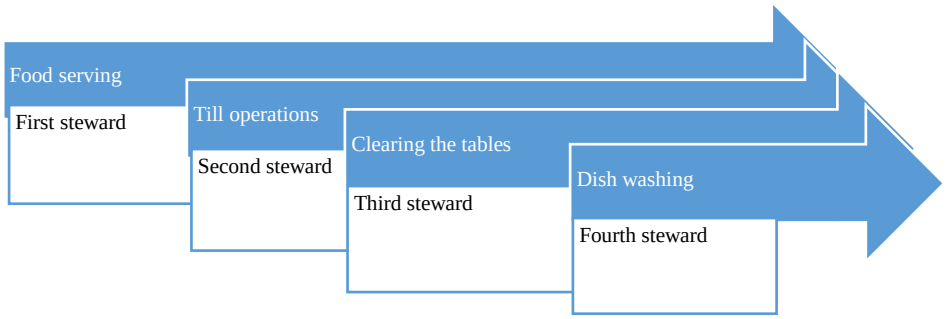

Figure 3. The horizontal distribution of work

The vertical division of labor separates work coordination activities from actual activities (production and service), forming organizational levels of management (Figure 4), and shows a higher value of work within a company.

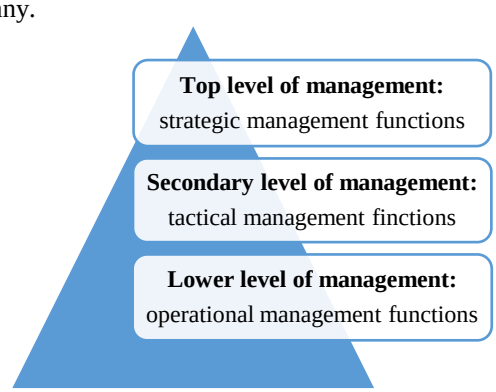

Figure 4. Organizational levels of management [3]

Ensuring effective work helps organizations handle their management structures - a clear hierarchical view.

An organizational management structure is a combination of linear, functional and target management elements interconnected by linear and functional subordination relationships. According to the nature of the relationship between the elements of the structure and the nature of the subordination, the management structure of an organization can be made up of various combinations of management levels, in turn forming a management hierarchy [4].

Three types of organizational management structures are distinguished: linear, functional, and a matrix.

The linear structure of organizational management is best suited for catering services on board sea ferries as well as many other ships (Figure 5). The linear organizational structure is one of the basic organizational arrangements. The positions and relations of superiority and inferiority are arranged and oriented vertically. Each superior has clearly assigned subordinates and each subordinate has a specially assigned superior [12].

This type of structure is characterized by:

– A minimum number of management levels;
– Clear subordination;
– Direct relationships between management levels.

This is the oldest structure among organizational management structures [12].

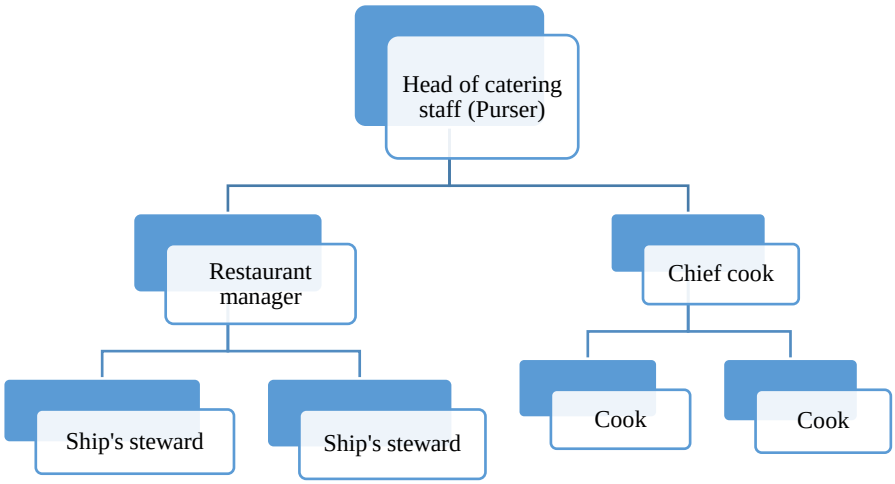

Figure 5. The linear structure of organizational management used by the catering department on board

Although the number of ship's stewards and cooks can vary, the structure itself always remains the same.

The linear structure has its own advantages and disadvantages.

Advantages:

– Strict relations between superiority and inferiority;
– Strict and clear subordination;
– Coordination of subordinates activities;
– Personal responsibility of managers.

Disadvantages:

– Large, intense flow of information;
– Transfer of insignificant issues to a higher level of management;
– Decrease in initiative and independence of lower levels;
– A lack of competence of managers to cover all areas of work activity [7].

Linear organizational management structures are characterized by a small number of workers within an organization, performing uncomplicated activities that do not require complex competence [6].

Structural unit formation is a grouping method of similar and logically related work activities into structural units. Managers simply form an organizational management scheme that shows the distribution work. Such a scheme (usually square) shows logical grouping of work activities, called structural units [3].

In the case of catering services on board sea ferries, those working in the restaurant area (activities include: clearing tables, washing floors, collecting trays) can be grouped into a structural unit - "restaurant area staff", and those who work in the kitchen (dish washing, tray cleaning) can be grouped into the "kitchen staff" structural unit. Therefore, the formation of units is a manager's decision: by dividing work into tasks, the tasks can be grouped together into "similar" groups (units). Organizations have different work and as such different structural units, and work and structural units in one organization are different from works and structural units in another.

Coordination is a process of integrating separate structural units effectively in order to achieve the goals of an organization. Without coordination, employees would not be aware of their role in the entire organization and would only care about personal goals, subsequently using the goals of the entire organization for personal gain [7].

The level of coordination depends on the nature of the tasks performed and on the level of interdependence of the staff who perform them in different units. When the tasks require this or when communication between departments can be beneficial, a high level of coordination is best suited. If the exchange of information is less important, work can be done more efficiently, with less time wasted on interaction with other departments [4].

A high level of coordination is particularly crucial in organizational management on board ferries, because this work is unpredictable and is constantly changing. In addition, high performance goals are enforced. Coordination problems can be easily solved by constantly rotating tasks between employees. This helps to avoid the monotony of continuously recurring work, moreover, employees become more flexible, knowledgeable and are able to carry out any task or job in the field. Coordination of work on board ships is especially important for the entire work process to succeed.

Conclusions

Catering services on board ferries require organizing the entire process of work, so that the work within the company is done in a timely manner. In the case of organizing work within an organization, it depends largely on the division of labor between the employees, so that employees are not responsible for the entire task, just for the individual activities that it comprises. The linear structure of organizational management, the main feature of which are strict relations between superiority and inferiority, perfectly ensures the control of work performance. The formation of structural units demonstrates exactly which activities the ship's steward must perform, and coordination, without which employees would not know their role within the organization and would not be pursuing one goal. These factors make it possible to ensure a smooth provision of catering services on board a ferry.

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DESIGNING INTEGRATED MANAGEMENT SYSTEM LEARNING COURSE FOR SEAFARERS

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Abstract
The aim of the paper is to explain the content of integrated management system learning course for seafarers. The overall learning objectives and outcomes of this course is to provide awareness, knowledge and skills required of students of maritime faculty- potential ship-board and office-based staff - on quality, environmental, safety and ship energy management system and plans and their implementation. It aims to provide general information on ISO 9001 (QMS) on quality management system, ISO 14001 (EMS) on environmental management system, ISM code (SMS) – safety management system, ISO 5001 on Energy management system (EnMS), OHSAS 18001 on occupation health and safety, ship and company related management systems and plans and specific tools for monitoring of processes, audits, performance monitoring, data collection, reporting and verification.
Keywords: *integrated management system, ISM, EMS, OHSE, EnMS, learning course*

Main aspects of a management system

The cornerstone of good management is commitment from the top management and dedication from the operating personnel. In matters of safety, pollution prevention and energy saving, it is the commitment, competence, attitudes and motivation of individuals at all levels that determines the end result. The foundation of the ISM Code (International Safety Management Code) is largely based on the philosophy of quality management, the key fundamentals of which include:

- Management commitment;
- Staff/personnel empowerment; and
- Continuous improvement.

The role of the top management is crucial when improving the quality or safety or environmental protection or conservation of resources of a company is concerned. Firstly, the management is responsible to set a company policy which describes where and how the company should aim and perform in terms of quality, safety, environmental and energy conservation issues. Secondly, the management is responsible for providing adequate resources and tools in order to ensure that the company policy could be successfully implemented. Also, the management is responsible for setting realistic and achievable targets for the company's quality, safety, environmental and energy performance. The performance should be reviewed on a regular basis and the previous targets should be updated on the basis of actual performance.

The involvement of the personnel is a pre-requisite for a successful management system. Employees should have a feel of ownership in this regard. This is normally achieved by providing an opportunity for them to participate in establishing, implementing and operating the management system at various organisational levels. In many organisations, it is not necessarily lack of knowledge and awareness that is responsible for poor performance but it is the lack of this feel of ownership and motivation to act and commitment that leads to poor performance in various areas. For the proper designing the learning course, it's very important to cover all necessary aspects of management systems, develop right approaches for delivery knowledge and skills, and built understanding of integrated system specify, simplify the assessment criterias and conduct assignment briefs.

PDCA cycle of continuous improvement

The concept of "continuous improvement" requires that a company improves the quality of its products and services on a continuous basis and at all organisational levels. A common approach to continuous improvement is the PDCA (Plan – Do – Check – Act) process.

The four major phases of the continuous improvement cycle are the following.

Plan. During this first phase of the PDCA cycle, an action plan of the activities that need to be done is prepared together with all relevant implementation details. For this purpose, the company need to

have a policy statement and should define the objectives and targets, plan on how to achieve these targets and identify how to implement and how to monitor various activities when the plan is implemented.

Do. In the second phase, the implementation of the selected and documented measures should be carried out in a systematic way. In other words, this is the execution phase of the action plan developed. To be successful, project management of various measures under implementation is very important and the action plan should be executed within the schedule and budget.

Check. In the third phase, one should measure or analyse the results of the implementation via effective monitoring and checking. This is the step under which the results of implementations are measured and monitored to ensure that the perceived objectives are achieved. Without this step, there is no way to know if the implementation has been satisfactory or not. Data collection and analysis plus various aspects of audits and surveys could be used for this purpose.

Act. In in last phase the assessment of the effectiveness of plan is done. The plan is reviewed against the achievements and new targets are set for next cycle of PDCA. If the check shows that the plan that was implemented led to improvements, then new standard or baseline or targets for future cycle of PDCA activities are set. Otherwise, the reasons for not meeting the objectives need to be evaluated and the plan adjusted according and the new cycle to be started.

The above PDCA cycle principles apply to any management system irrespective of area of application. In this module, it will be shown frequently that various shipping related management systems also follow the above generic principles.

Management system and shipping

The concept of "management system" is not new to the shipping industry. One of the most prominent management system that is already mandatory in shipping is the ISM Code that as the name implies deals with shipping safety at its core. There are other management systems that although not mandatory, are widely adopted by the shipping companies including the following:

- Quality management system, mainly known as ISO 9001;
- Environmental management system, mainly known as ISO 14001;
- Health and safety systems such as those based on OHSAS 18001;
- Energy management system such as those specified under ISO 50001.

In the next subsections, a brief overview of these standards together with their similarities and overlapping aspects will be given.

ISM Code

According to IMO, the main objective of the ISM code is to provide an international standard for the safe management and operation of ships and for their pollution prevention.

- Governments are required to take the necessary steps to safeguard the shipmaster in the proper implementation of his/her responsibilities with regard to maritime safety and the protection of the marine environment.
- Recognised the need for the shipping companies to set up appropriate management system to enable them to respond to the need of those on board ships to achieve and maintain high standards of safety and environmental protection.

The ISM code is effectively a shipping-specific International rules and regulations with the ultimate objectives:

- To ensure safety at sea
- To prevent human injury or loss of life
- To avoid damage to the environment and to the ship.

The ISM code is based on some general principles and objectives. These are expressed in broad terms so that ISM code can have a widespread application to all different type of organisations involved in shipping despite their diverse business. Clearly, different levels of management, whether shore-based or ship-board, will require varying levels of knowledge and awareness of the items outlined.

SOLAS adopted the ISM code in 1994 and incorporated it into its chapter IX. By 2002 almost all of the international shipping community was required to comply with the ISM code. In order to comply with the ISM code, each ship must have a working Safety Management System (SMS). Each SMS would consist of the following elements:

- Commitment from top management
- A top level defined policy manual
- A "procedures manual" that documents what is done on board the ship, during normal operations and in emergency situations
- Procedures for conducting both internal and external audits to ensure that the ship is doing what is documented in the "procedures manual"
- A designated person ashore to serve as the link between the ship and shore staff and to verify the SMS implementation
- A system for identifying where actual practices do not meet those that are documented; and the associated corrective actions
- Regular management reviews

Another requirement of the ISM code is for the ship to be maintained in conformity with the provisions of relevant rules and regulations and with any additional requirements which may be established by the shipping company itself. As part of ISM code, compliance verification should be in place. Each ISM compliant ship is audited, first by the company itself (internal audit) and then each 2.5 to 3 years by the flag State "maritime administration" to verify the effectiveness of the SMS. Once SMS is verified and it is working and effectively implemented, the ship is issued with a Safety Management Certificate (SMC).

It should also be noted that a ship's planned maintenance scheme is a statutory requirement of the ISM code. The ISM code requires that the ship's management provide sufficient resources to maintain the ship safely and the company must supply the necessary resources in the way of parts or shore-side assistance to do this. Poor maintenance can mean that either the ship cannot meet its commercial obligations (for example unable to meet the minimum speed requirements defined in the contract) or can pose a potential safety or environmental hazard. The management should ensure regular audits of ships to verify that the maintenance required by the planned maintenance system is being carried out. This inspection of the ship should be part of the internal audits required by the ISM code and should not be left for statutory or class surveys at a later stage.

Standards other than ISM

There are a number of management system standards developed mainly by the ISO that have been extensively used. These are standards and not rules and regulations and as such their use is mostly voluntary. However, some of these well-known standards are widely used by most industries including shipping and will be briefly introduced.

ISO 9001 – Quality Management System

The ISO 9000 series of standards are related to quality management systems and designed to help organizations ensure that they meet the needs of their customers / clients and other stakeholders while meeting statutory and regulatory requirements related to their delivered products or services. The ISO 9001 certification is highly oriented towards "process improvements" taking into account the customer needs.

ISO 9001 is the most commonly utilised standard for quality management. Its wider application started initially in manufacturing companies in 1980s. Later on, its application expanded into service business and public administration mainly in the middle of the 1990s. In shipping, many companies so far have adopted the ISO 9001 quality standard as the basis for their company's "quality management system".

ISO 14001: Environmental Management System (EMS)

ISO 14000 series of standards relate to environmental management and has been developed to help organizations to minimize the negative impacts of their operation on the environment via ensuring compliance to prevailing applicable laws, regulations, and other environmentally oriented requirements as well as best practice. ISO 14001 requires the organization to assess all of its environmental aspects related to the company's activities, products and services. So, in a nutshell, ISO 140001 main requirement is that the significant environmental aspects of a company should be identified, documented and managed.

The first international version of ISO 14001 was published in 1996. Like any other of widely used

management system standard, ISO 14001 has evolved over time and the current version of the ISO 14001:2015 includes the concept of continuous improvement process approach.

In a shipping company, the company policy may include the implementation of ISO 14001 on its vessels which contains procedures for selecting the best environmental measures for a particular vessel and then sets objectives for the measurement of relevant parameters along with relevant control and feedback features. The implementation of ISO 14001 has the main advantage of reducing a company's environmental impacts.

As many ships and companies already have an ISM code related management system that should include environmental protection, it would make sense for these companies to have an ISO 14001 compliant environmental management system; however as discussed before this is not mandatory and care should be exercised not cause complications with regard to ISM related Flag State and Port State Control inspections. Once an environmental procedure becomes part of the ship's SMS, it is mandatory to follow the processes even if the requirements are not mandatory in other statuary legislation.

OHSAS 18001: Occupational Health and Safety Assessment Specification

OHSAS 18001 (Occupational Health and Safety Assessment Specification) is a British Standard (BS) that is used globally and provides a specification for occupational health and safety management in any organization. The OHSAS 18001 is widely used internationally and is intended to help organizations to control occupational health and safety risks. OHSAS 18001 focuses on the need to identify all occupational health and safety hazards for personnel related to the company's activities and facilities and do relevant risk assessment. The result of these assessments is then used to identify the hazards that have to be eliminated or controlled.

The OHSAS 18001 has been harmonized with the ISO 9001 and ISO 14001 standards so that to help organizations to integrate the quality, environmental and safety management systems easier into one common management system.

ISO 50001: Energy Management System (EnMS)

ISO 50001 is an international standard for an energy management system. The standard specifies the requirements for establishing, implementing, maintaining and improving an energy management system (EnMS). The purpose of EnMS is to enable an organization to follow a systematic approach in achieving continual improvement of energy performance in their organisation. ISO 50001 establishes systems and processes to improve energy performance and as a result, enable reductions in energy costs, GHG emissions and other environmental impacts. ISO 50001 is the subject of detailed description in the next section.

Commonalities between management standards

Although the above categories of standards deal with different management aspects, their overall requirements, processes and procedures have similarities and overlap. Understanding of their similarities and overlaps helps with an integrated approach to their implementation. In this section, some of these aspects are clarified such that if a trainee is familiar with one of these management systems or standards, he/she could relate the other standards to this one as an aid for quicker and deeper understanding. Also, this section aims to provide more information on the requirements of each standard, complementing what mentioned about them in previous section.

The commonalities of these standards are so much that there are many publications that compare them and there are many companies who offer an integrated service in dealing with their implementation and certification. In shipping, for example, ABS guidelines for such services [ABS 2012] are written as a unified one that includes all of the above standards in one guideline. DNV also in its publication [DNV 2013] offers a good and systematic comparison of these standards in terms of their common aspects and also their complementary aspects. The following comparisons are mainly a shortened version of the DNV comparisons in this regard [DNV 2013] that is hereby acknowledged.

On objectives and policies

This aspect relates to the role that top-management of the company must play. Many aspects of the requirements for top management roles in the ISM code and the other management standards are similar. Accordingly, the top management shall define policies relevant to the nature of the business and as a framework for objectives and targets. As a minimum, objectives and targets should demonstrate the company's goals for health and safety protection, environmental concern, energy performance and so on. In addition to the above, specific objectives and targets are required by the various standards for compliance purposes.

System management

The "system management" refers to management procedures and assignment of roles and responsibility. Instructions and procedures are required to be in place in order to operate ships safely, protect the environment, control its occupational health and safety risks and comply with relevant international and flag State legislation. Defined levels of authority, responsibility, lines of communication, resources and support, plans for key shipboard operational procedures, risk assessments, accidents and nonconformity reporting procedures, emergency procedures, internal audits and management reviews are all part of the system requirements. For this purpose:

- The ISM code requires designated person(s) to be appointed.
- For ISO 9001, it is required to identify a quality management representative and describe elements in the ISO 9001 standard that not already addressed in the existing safety management system. The customer should be defined and a system for measuring and monitoring the service provided to satisfy the customer's needs have to be put in place.
- For ISO 14001, it is a requirement for top management to appoint an environmental management representative and provide resources to manage and control the environmental system. All environmental aspects shall be assessed, by considering normal and abnormal operations and potential emergency conditions. The significant aspects shall then be identified and managed. Procedures for receiving, documenting and responding to communication from external interested parties shall be established.
- For OHSAS 18001 and similar to ISO 14001, all occupational health and safety hazards must be identified and assessments of risks carried out. A safe system of work must be established, employing a hierarchy of controls. Employee consultation and participation is required.
- As for ISO 50001, the main goal of the standard is a reduction in energy use. This is achieved through continual improvement in energy performance. The organization is required to conduct and document energy planning via an energy review, establish an energy baseline, performance indicators, objectives, targets, action plans etc.

Continuous improvement

The following could be related to ISM code and other standards:

- As part of ISM code, objectives to continually improve safety management skills ashore and on-board via analysis of nonconformities, accidents and hazardous situations need to be achieved. Procedures for maintenance of the ships in the fleet are required. Use of risk assessment techniques is necessary.
- As for ISO 9001, customer needs, expectations and requirements have to be taken into account. A procedure for analysis of data to improve the quality effectiveness of the management system is required. Procedures for eliminating the causes for potential non- conformities are also required.
- For ISO 14001, the company should establish an environmental management programme that addresses all of its objectives and targets including schedules, resources and responsibility for achieving them. The environmental programme helps the company improve its environmental performance and meet its commitment to continual improvement.
- For OHSAS 18001, the company should establish an occupational health and safety programme that addresses all of its objectives and targets, including schedules, resources and responsibilities for achieving them.
- For ISO 5001, the company is required to plan its energy use when working to achieve its energy targets. This means to develop and carry out an energy review and establish energy baselines. The company is required to use performance indicators. Checking and monitoring is done against the indicators.

Human resources - personnel

On human resources and staff, all the management systems give significant priority to train and motivate the staff in related areas:

- For ISM code, the company should ensure that seafarers are qualified, certified and medically fit.
- As for ISO 90001, the organization shall assign personnel to ensure that those who have defined responsibilities are competent. The company should also evaluate the effectiveness of training.
- As for ISO 14001, all employees shall be trained in and be aware of their roles and responsibilities and the significant environmental impact of their work etc.
- As for OHSAS 18001, all employees shall be aware of their roles and responsibilities, the occupational health and safety consequences of their work activities etc.
- As for ISO 15001, employees should be familiar with their roles and responsibilities. Training in energy management system, benefits of energy management etc. is required. This extends to contractors and third parties working on-board that may be affecting energy use.

Ship maintenance system

The ship maintenance management is also part of the management standards including:

- For the ISM code, maintenance procedures covering at least all items that are subject to class, statutory and additional company requirements are required.
- For ISO 90001, planning and control of appropriate procedures are required, as are purchasing procedures. The maintenance must extend to include care for customer property, including where work on-board affects customer property indirectly.
- For ISO 50001, maintenance plans extends to areas identified and considered as significant energy users in order to avoid a failure affecting the energy performance.

Verification and inspection

Measurement, monitoring, verification and inspections are part of all the management systems.

- Based on ISM code, regular on-board verifications and inspections are required.
- In ISO 14001, the company must have a systematic approach to measure, monitor and evaluate its environmental performance.
- In OHSAS 180001, the company must have a systematic approach to measure, monitor and evaluate its occupational health and safety performance.
- For ISO 50001 compliance, the company should define and regularly review energy measurement needs. An energy measurement plan is required. Measurement equipment must be calibrated with records retained. Standard gives minimum requirements to be considered.

Performance and monitoring

Common to all standard, effective procedures for reporting non-conformities and hazardous situations are required. New requirements for e.g. energy management should be reflected in the company management system. Data analysis, implementation of preventive actions and continual improvement procedures are required.

- For ISM code purposes, there is a requirement to have a designated person ashore to monitor safety and pollution prevention aspects.
- For ISO 90001, ways of measuring and monitoring operational performance are required. This includes establishing data analysis processes, improving system effectiveness and continual improvement.
- For ISO 140001, procedures for regular monitoring and measuring key operations that have significant environmental impacts are required. Evaluating compliance with relevant environmental legislation and regulations is also required.
- For OHSAS 180001 compliance, procedures for monitoring and measuring occupational health and safety performance on a regular basis. Evaluating compliance with relevant legislation and regulations is also required.
- As ISO 50001, the company should identify energy performance indicators based on the energy review and the energy baseline. Measurement will be carried out against these performance indicators.

Management review

Common to all, the company should verify compliance and evaluate the efficiency and effectiveness of the management system. Management reviews covering all of the company's systems at defined intervals, are required, including input from master.

- For ISO 90001, monitoring and measurement of management system performance including customer satisfaction is a requirement.
- For ISO 14001, the organisation shall evaluate the environmental performance and the conformance with the environmental policy, objectives and targets. Evaluating compliance with relevant environmental legislation and regulations.
- For OHSAS 18001, the organisation shall evaluate the health and safety performance and the conformance with the policy, objectives and targets. Evaluating compliance with relevant legislation and regulations.
- For ISO 50001, the management review will evaluate the energy performance, the suitability of the performance indicators and whether or not targets have been met. It will also look at projected energy performance. Outcomes may include changes in baseline, performance indicators, resource allocation etc.

Certification and other aspects

As indicated above, all the shipping related management systems, whether mandatory such as ISM or voluntary such as ISO 140001 and ISO 50001, have general features that are common between them. This is despite the fact that different systems focuses on different aspects of safety, environment or energy efficiency. Management certification is one way of demonstrating, in particular to external parties, that the company is complying with the above standards.

In shipping the main bodies that provide management system certification services to the industry are classification societies. As indicated by two examples [ABS 2012 and DNV 2013], class societies use integrated processes and guidelines to deal with all the above standards. For example, ABS has published a marked-up version of their guidelines on "Guide for Marine Health, Safety, Quality, Environmental and Energy Management" that shows how for example "energy management" has been added to the previously used guidelines that have been dealing with "Marine Health, Safety, Quality and Environmental" only.

Some class societies have published dedicated rules for certification of "ship energy management"

that only deals with SEEMP aspect of energy management. Chinese Classification Society (CCS), in 2011, published their "Rules for Certification of Ship Energy Management" that deal with all aspects of certification including system requirements, data requirements, certification and energy audit for ship-board energy management.

On energy efficiency side, all classification societies provide services in "energy management system certification" and a number of companies have been certified so far. Being a new standard (i.e. ISO 50001), the number of certified shipping companies are not many yet. However, it is expected that with time and due to the significance on climate change debates, more and more companies will allocate resources to deal with energy saving and energy efficiency over the time.

Conclusion

This learning course of integrated management systems, which includes ISM code and ISO 9001, 14001, 18001 and 50001 standards gives trainee/students proper understanding of basic concepts of complimentary in nature and comprehensive management system.

There are many common or interfacing requirements between the ISM code and ISO 9001, 14001, 18001 and 50001 standards, therefore proper combination of these systems lead to a more efficient way of managing safety, quality, environmental issues, occupational health and safety and Energy management. This learning course is intended to build appropriate skills.

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INTEGRATED RESEARCH METHODS FOR NASCENT DECK OFFICERS

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Abstract
It is a growing responsibility for present deck officers of vessels engaged in international shipping including not only financial responsibility, but mental as well. That is related to reactive stress tolerance, attention and reaction speed in cases that require high response to situational awareness and avoiding risks of collision. Determination tests to measure stress tolerance and ability to react, for example Schuhfried Determination Test, can be used for nascent deck officers. That can help to determine one's ability to use previously gained skills, knowledge, and attitude in future. Becoming a competent deck officer is a complex process that starts even before entering maritime educational institutions at time when our response to different stimulus is already strengthened during lifetime. This paper provides using opportunities of complex multi-stimuli reaction test in deck officer's educational process and gives an example and the result of test carried out so as encourages thinking about integrated research methods in maritime education.
Keywords: *reaction, response, stimulus, stress tolerance.*

Introduction

European Maritime Safety Agency at its summary overview 2011 – 2015 of maritime casualties and incidents note that during 2015 there were 3296 accidents that resulted in 115 fatalities, 976 persons injured, 36 ships lost and 64 pollution events. Very serious marine casualties involving a death, the total loss of a ship or severe environmental damage have remained steady over the five-year period [3] (Figure 1).

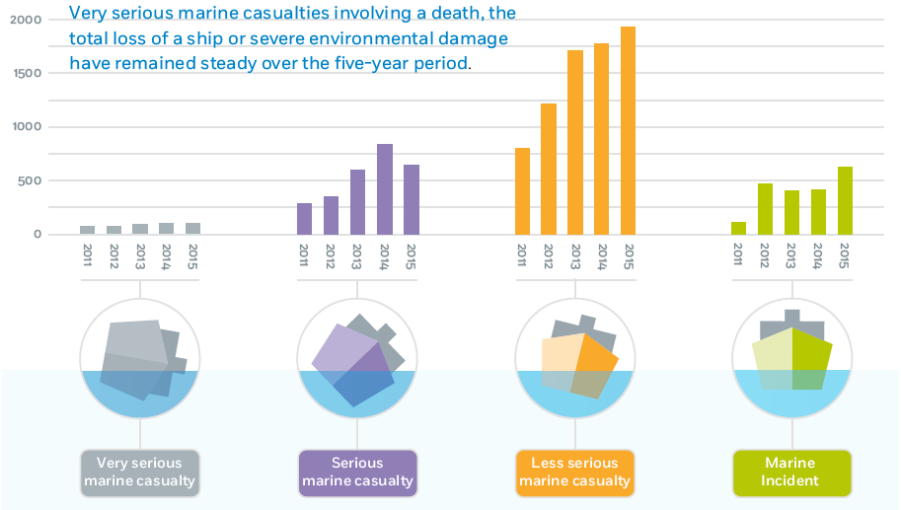

Figure 1. Number of marine incidents and casualties per severity [3]

During investigations launched and safety recommendations done there are 40% concerning operational practice, 17 % related to human factors and 15 % for navigation [3]. Still there are figures by International Maritime Organization (IMO) that safety and security of life at sea, marine environment protection and over 90% of the world's trade depends on the competence and professionalism of seafarers [4]. International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, as

amended, describes navigational watchkeeping principles as proper look-out to make a full appraisal of situation and risk of collision as it is required by Rule 5 in the International Regulations for Preventing Collisions at Sea (COLREG-72) [5].

That leads to make interdisciplinary research for human abilities to react on stimulus concerned with hearing, vision and ability to keep the senses upon stress tolerance. Studying the ability to keep the reaction time constant leads to necessity to define mean reaction time that is measured after response to several successive stimulus (reacting on sound, light, coordination needs) [1]. It is accepted that figures for mean simple reaction times for college age individuals have been about 190 ms (0.19 sec) for light stimuli and about 160 ms (0.16) for sound stimuli. Reacting on stimulus has been widely analyzed and gives plenty of interesting facts, for example: cite literature shows that visual stimuli perceived by different portions of the eye produce different reaction times. The fastest reaction time comes when a stimulus is seen by the cones (when the person is looking right at the stimulus). Additionally, Hick's Law states that the time required to reach a decision increases logarithmically with the number of choices—this means that the increase in time taken becomes less significant as the number of choices continues to increase (figure 2). Reaction time is affected by several factors, such as humans' age, gender, fatigue, left or right hand operation, surrounding events [2, 7].

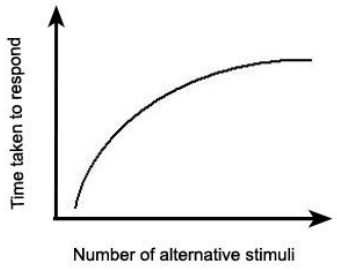

Figure 2. Time taken to respond related to number of alternative stimuli [2]

Determination test in Vienna Test System

Determination tests (DT) to measure stress tolerance and ability to react, for example Schuhfried Determination Test, can be used for nascent deck officers. That can help to determine one's ability to use previously gained skills, knowledge, and attitude in future. Becoming a competent deck officer is a complex process that starts even before entering maritime educational institutions at time when our response to different stimulus is already strengthened during lifetime.

According to Vienna Test System Manual DT is used to measure reactive stress tolerance and the associated ability to react. The test requires the respondent to use his cognitive skills to distinguish different colours and sounds, to memorize the relevant characteristics of stimulus configurations, response buttons and assignment rules, and to select the relevant responses according to the assignment rules laid down in the instructions and/or learned in the course of the test. The difficulty of the DT arises from the need to sustain continuous, rapid and varying responses to rapidly changing stimuli. There are several forms of tests: S1 (adaptive short); S2 (adaptive); S3 – S6 are forms that vary in their reaction mode, length for stimulus material. For all test forms the internal consistencies for the main variables lie between $r = 0.98$ and $r = 0.99$.

The Determination Test (DT) is a complex multi-stimuli reaction test involving the presentation of both coloured stimuli and acoustic signals; the subject responds by pressing the appropriate buttons on the response panel (figure 3) and using the foot pedals. The DT requires the following cognitive skills: the discrimination of colours and sounds, the ability to remember the relevant characteristics of stimulus configuration, response buttons and assignment rules, the selection of the relevant response in accordance with the assignment rules laid down in the instructions or learned in the course of the test. [6]

Figure 3. The interface of stimulus ar DT [6]

It was Form S1 chosen for testing. That means short form with adaptive stimulus presentation. All the stimuli described above are presented in Adaptive Mode. The duration of the test is 4 minutes. In Manual it is stated that Adaptive Mode (automatically varied presentation time) is form where the speed of stimulus presentation depends on the respondent's pace of work. The duration of each stimulus is calculated as the mean of the previous 8 reaction times. If the response to a stimulus was not correct, the reaction time is doubled for the purpose of calculating the duration of the next stimulus. This form of presentation ensures that the subject is always working at the limit of his ability and that "reactive stress tolerance" is therefore being fairly measured. The speed of stimulus presentation is continuously adapted to the respondent's working speed. A test session is divided into a number of subtests, which can be presented either as practice or as assessment tests. The same presentation mode is used throughout a subtest. The subtests are divided into intervals, all of which contain the same number of stimuli or (in Action Mode) are of the same length. In Reaction Mode the time for which stimuli are presented can vary between but not within intervals. Interpretation objectivity does, however, also depend on the care with which the guidelines on interpretation given in the chapter "Interpretation of Test Results" are followed. For deeper view, please see Vienna Test System Manual [6].

Results

DT was carried out in Latvian Maritime Academy in fall 2016. The first, third and fifth grade students of Navigation department were tested to analyze the results. The following analysis allows to better understand learning and behavior interferences and their correction options. Comparing the results can be done before and after correcting measures among different genders, ages, education and other specific criteria.

In test forms (S1-S6) reactions are assigned to stimuli as follows: colours white, yellow, red, green, blue by round buttons, tone low (100 Hz) - rectangular black button, lower centre, tone high (2,000 Hz) - rectangular grey button, upper centre, foot signal left - left pedal, right - right pedal. [6]

In Appendix to this paper you can see the summary of correct (*pareizi*) and incorrect (*nepareizi*) responses of all involved students (Figure 4) and the report of one student as an example of testing protocol (Figures 5-8) for deeper view.

Conclusions

Complex multi-stimuli reaction test in deck officers educational process gives an example and the result of test carried out and encourages thinking about integrated research methods in maritime education. DT showed that average reaction time in particular test mode remains approximately still among three grades of students at LMA. The first year students' average reaction time is 0,703s, the third year students – 0,690s and the fifth year students – 0,705s. It must be highlighted that the 1st year students showed the higher correct reaction on stimulus – 92,1 % of average correct responses, compared to 91,7% (3rd year) and 90,7 % (5th year). Summary of results shows that correct response on green colour is lower than response on other colours making it 83,35 % (see Figure 9). Reminding that green is one of colours used in COLREG-72, it is essential to pay further attention to that fact. However, response on tones is even worse. Only 77,75 % average response on high tone from the 5th year students and 80,25 % correct response on low tone overall. It must be considered due to plying in restricted visibility, when hearing sound signals in close proximity sometimes are the only way how to observe vessels in vicinity and they cannot be visible in radar screen because of blur from heavy seas, rain or snow conditions.

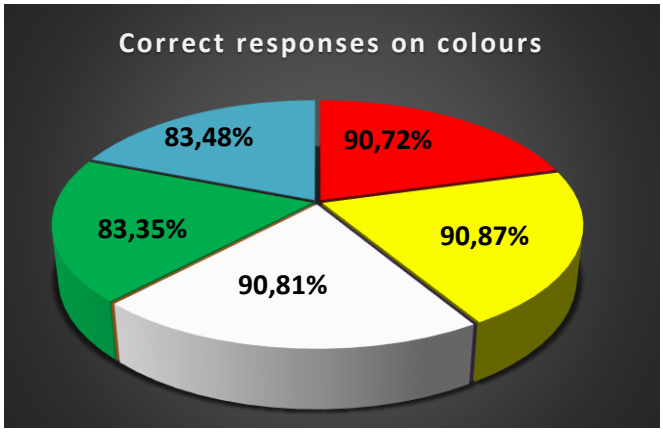

Figure 9. Response on colours by students, overall average

During testing procedure it was concluded that responding to luminous colours is better than on tones. Students become more stressful during testing after mistaking buttons and senses, in some cases panic started when mistakes were observed, younger students looked more concentrated on given task. With full reports on DT You can get acquainted in LMA Department of Maritime Transport. It is highly noted that further investigation in stress tolerance of nascent navigation officers must be done as well as making similar stimulus tests that involves real-time situations concerning collision avoidance rules.

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Appendix

	Response on colours										Response on tones			
	white		yellow		red		green		blue		high		low	
	Reakcija uz krāsām										Reakcija uz skaņām			
	Baltā		Dzeltenā		Sarkanā		Zaļā		Zilā		Augstais tonis		Zemais tonis	
	Pareizi	Nepareizi	Pareizi	Nepareizi	Pareizi	Nepareizi	Pareizi	Nepareizi	Pareizi	Nepareizi	Pareizi	Nepareizi	Pareizi	Nepareizi
the first year students	31	2	27	7	30	4	23	13	26	7	31	2	25	10
	29	6	30	2	30	0	26	5	30	4	24	8	17	14
	27	6	30	5	31	2	29	5	28	5	28	8	21	10
	29	3	33	2	33	2	33	2	29	8	33	3	23	10
	30	3	32	2	32	7	33	3	28	7	30	5	30	3
	32	0	30	1	31	1	26	6	30	6	30	3	26	5
	32	0	34	0	32	1	28	4	28	3	34	0	29	2
	33	1	35	2	34	2	35	4	34	3	35	7	32	4
	29	4	31	2	30	1	30	5	26	10	30	5	15	15
	32	0	31	1	29	3	30	2	23	9	29	4	23	7
the third year students	30	2	27	6	30	2	23	9	26	5	31	2	25	9
	31	1	32	1	32	2	29	4	26	6	30	3	21	9
	31	0	30	2	30	0	28	3	30	1	30	2	29	0
	30	4	29	6	28	6	26	12	25	9	29	8	26	10
	31	1	32	3	30	6	27	5	29	6	25	9	28	3
	27	6	32	3	31	5	29	6	31	3	29	7	27	6
	32	3	33	2	32	2	34	1	33	3	33	5	30	4
	24	8	27	5	23	9	24	10	26	6	26	7	24	8
	32	2	33	3	32	5	33	4	32	3	34	3	32	1
	25	6	28	3	27	8	26	6	30	3	25	9	29	3
the fifth year students	24	2	25	2	26	0	23	3	22	5	21	6	22	4
	28	1	29	0	29	0	27	2	26	3	26	4	26	3
	32	4	35	5	34	0	34	2	32	2	29	10	26	9
	30	3	33	5	30	5	26	8	24	11	24	12	28	3
	22	6	26	3	23	4	20	8	21	8	18	9	24	5
	32	2	31	0	29	6	27	4	30	3	29	4	28	1
	33	4	34	3	37	2	29	9	35	6	37	3	34	7
	30	1	29	1	30	1	26	5	24	6	23	9	21	8
	34	0	33	10	33	2	31	11	34	2	29	10	27	11
Total responses to stimulus and % of correct responses	27	9	35	6	31	5	31	8	31	15	33	10	32	8
	889	90	926	93	909	93	846	169	849	168	865	177	780	192
	90,81		90,87		90,72		83,35		83,48		83,01		80,25	

Figure 4. Summary of correct and incorrect responses on stimulus made by LMA students

born 08.02.1991, male, 25;8 years, Education level 5
Scoring code: lukins

Determination Test (DT)

Complex multiple-stimulus multiple-choice reaction experiment
Test form S1 - Short form with adaptive stimulus presentation (all stimulus types)
4 minute test duration

Test administration: 07.11.2016 - 08:23...08:29, Duration: 6 min.

Test results - Norm sample:

Test variable	Raw score	PR	T
Overall results adaptive mode (test duration: 4 minutes)			
Correct	285	88 (84-92)	62 (60-64)
Incorrect	60	2 (1-3)	29 (27-31)
Omitted	19	21 (16-27)	42 (40-44)
Median reaction time	0.62 [1]		
Number of stimuli	320		
Reactions	345		

Comment(s): Percentile rank (PR) and T-score (T) result from a comparison with the entire comparative sample 'Norm sample'. The confidence intervals given in parentheses next to the comparison scores have a 5% probability of error.

[1] Median reaction time in seconds

Comments and explanations on the test variables:

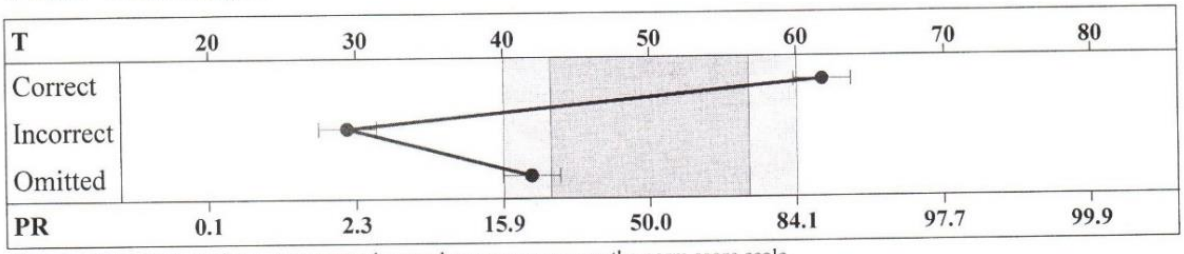
Correct:
This main variable details the total number of correct reactions made before the start of the next but one stimulus. It measures the respondent's ability to continue reacting quickly and appropriately in reaction chains, including when working close to his individual stress tolerance limit.

Incorrect:
This variable describes the tendency to confuse different reactions. Incorrect reactions arise because when under stress the respondent fails to shield the appropriate reaction from the influence of competing irrelevant stimuli.

Omitted:
This subsidiary variable indicates whether responses have been omitted under time pressure. Individuals with a very high score on this variable are likely to be unable to maintain their attention when carrying out tasks of this sort under stress; this means that in stressful situations they may tend to give up.

Notes:
- The above-mentioned comments and explanations on the test variables can be switched on or off at the "Extended Settings" tab of the Vienna Test System.
- A detailed description of all test variables with comprehensive notes on interpretation will be found in the digital test manual which can be displayed and printed out via the user interface of the Vienna Test System.

Profile - Norm sample:



Comment(s): The shaded area represents the usual average ranges on the norm score scale.

Figure 5. DT protocol, page 1/4

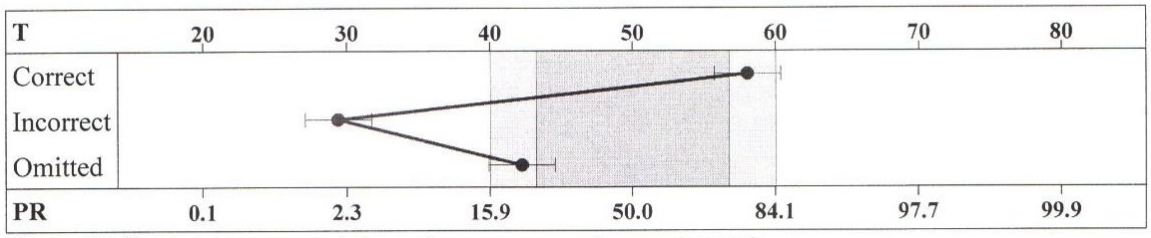
Test results - Norm sample (until 25 years):

Test variable	Raw score	PR	T
Overall results adaptive mode (test duration: 4 minutes)			
Correct	285	79 (73-84)	58 (56-60)
Incorrect	60	2 (1-3)	29 (27-31)
Omitted	19	22 (16-27)	42 (40-44)
Median reaction time	0.62 [1]		
Number of stimuli	320		
Reactions	345		

Comment(s): Percentile rank (PR) and T-score (T) result from a comparison with a part (selected according to Age) of the comparative sample 'Norm sample'. The confidence intervals given in parentheses next to the comparison scores have a 5% probability of error.

[1]Median reaction time in seconds

Profile - Norm sample (until 25 years):



Comment(s): The shaded area represents the usual average ranges on the norm score scale.

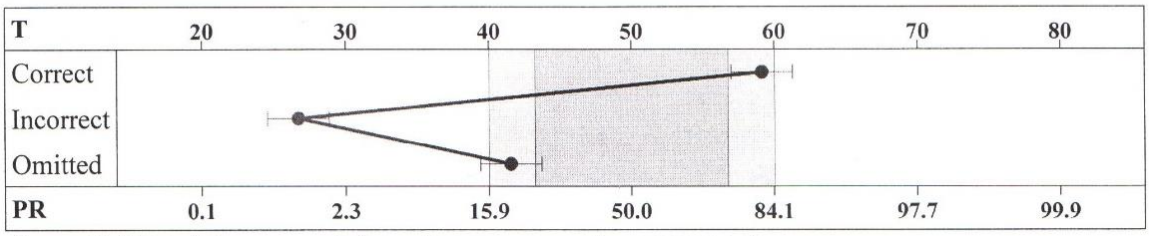
Test results - Norm sample (Education level 4-5):

Test variable	Raw score	PR	T
Overall results adaptive mode (test duration: 4 minutes)			
Correct	285	82 (76-86)	59 (57-61)
Incorrect	60	1 (1-2)	27 (25-29)
Omitted	19	20 (16-27)	42 (40-44)
Median reaction time	0.62 [1]		
Number of stimuli	320		
Reactions	345		

Comment(s): Percentile rank (PR) and T-score (T) result from a comparison with a part (selected according to Education level) of the comparative sample 'Norm sample'. The confidence intervals given in parentheses next to the comparison scores have a 5% probability of error.

[1]Median reaction time in seconds

Profile - Norm sample (Education level 4-5):



Comment(s): The shaded area represents the usual average ranges on the norm score scale.

Figure 6. DT protocol, page 2/4

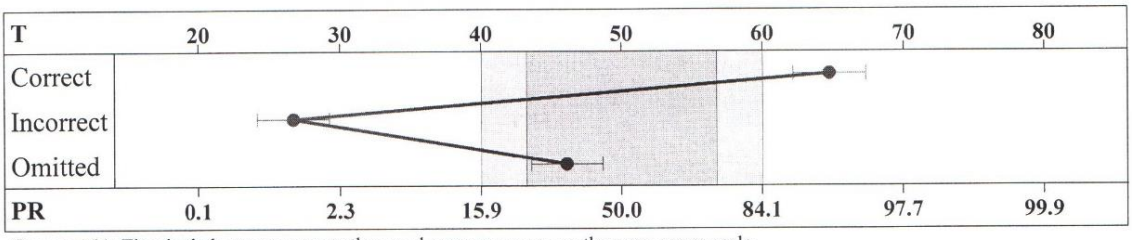
Test results - Drivers with increased risk:

Test variable	Raw score	PR	T
Overall results adaptive mode (test duration: 4 minutes)			
Correct	285	93 (88-96)	65 (62-68)
Incorrect	60	1 (0-2)	27 (24-30)
Omitted	19	35 (24-46)	46 (43-49)
Median reaction time	0.62 [1]		
Number of stimuli	320		
Reactions	345		

Comment(s): Percentile rank (PR) and T-score (T) result from a comparison with the entire comparative sample 'Drivers with increased risk'. The confidence intervals given in parentheses next to the comparison scores have a 5% probability of error.

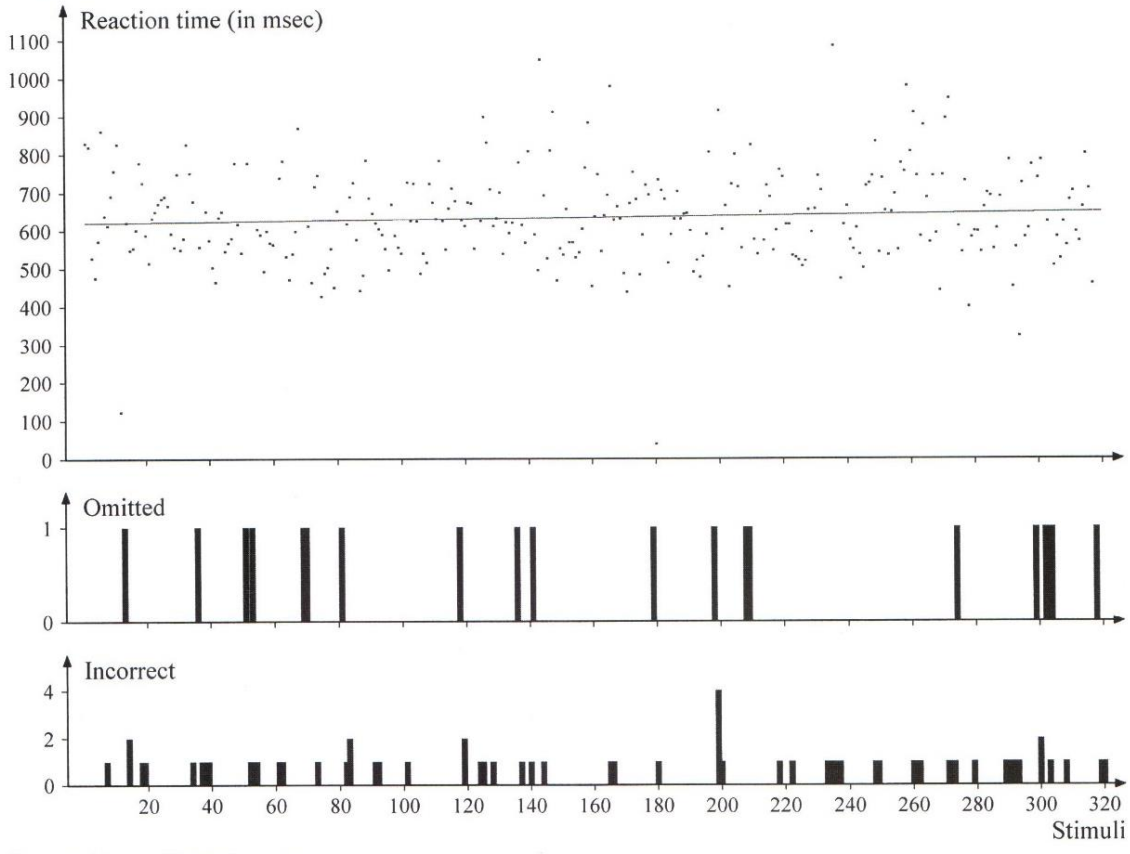
[1]Median reaction time in seconds

Profile - Drivers with increased risk:



Comment(s): The shaded area represents the usual average ranges on the norm score scale.

Progress chart:



Comment(s): —— Regression curve

Figure 7. DT protocol, page 3/4

Answer matrix:

Reactions (requested)	N.r. (0)	White (34)	Yellow (37)	Red (34)	Green (36)	Blue (35)	Right foot (35)	Left foot (35)	High tone (39)	Low tone (35)
White answers		27					1			
Yellow answers			35			1				1
Red answers				31	3	2	2	3	2	
Green answers		1	3	2	31	1	4		2	
Blue answers		1				30				1
Right foot answers		1			2	1	32			1
Left foot answers		2		1		8	2	34		1
High tone answers			2			1			33	3
Low tone answers					1	1			3	32
Omitted		4	1	2	2	2	3	1	3	1
Sum of wrong answers		5	5	3	6	15	9	3	7	7

Comment(s): The table above shows which and how many answers the subject actually entered for the reactions requested.

Figure 8. DT protocol, page 4/4

THE PECULIARITIES OF TRAINING COURSE "FIRST AID WITH CPR AND DEFIBRILLATOR FOR SEAFARERS"

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Abstract
Since the time of "Seafarers' Training and Certification Center" establishing on Batumi State Maritime Academy the IMO Model-courses 1.13" Elementary First Aid", 1.14 "Medical First Aid" and 1.15"Medical Care" are implemented and actively realizing. These training courses provide the seafarers/listeners with basic knowledge and practical skills of first aid on board, in accordance with the STCW Code. However due to continual and prompt development of medicine and medical equipment, the acute necessity to prepare, to implement and to realize a new training course, that complements the content of previous courses and allows to raise the level of the listeners theoretical knowledge and practical skills in accordance with the up-to-date requirements. For this purpose the training course "First Aid with Cardio-Pulmonary Resuscitation (CPR) and Automated External Defibrillator (AED)" was prepared and implemented in STCC at BSMA. To assure the suitability and effectiveness of the education/training process the basic approaches of validation and verification process were conducted.
Keywords: *training course, first aid, CPR, defibrillator, seafarer, internal verification.*

List of used abbreviation:
ABC – Airway – Breathing – Circulation
AED – Automated External Defibrillator
BSMA – Legal entity of public law, teaching university *Batumi State Maritime Academy*
CPR – Cardio-Pulmonary Resuscitation
STCW Code – Seafarers Training, Certification and Watchkeeping Code
IMGS – International Medical Guide for Ships
IMO – International Maritime Organization
ND – Normative Document
STCC at BSMA – "Seafarers Training and Certification Center at Batumi State Maritime Academy"

The training courses of "First Aid" provide the seafarers/listeners with basic knowledge and practical skills of first aid on board on the base of Airway-Breathing-Circulation (ABC) system. Continual and prompt development of medicine and medical equipment namely portable Automated External Defibrillator) has revealed the acute necessity to prepare, to implement and to realize a new training course, that complements the content of previous courses and allows to raise the level of the listeners theoretical knowledge and practical skills in accordance with the up-to-date requirements. For this purpose the training course "First Aid with Cardio-Pulmonary Resuscitation (CPR) and Automated External Defibrillator (AED)" was prepared and implemented in STCC at BSMA.

The training course "First Aid with Cardio-Pulmonary Resuscitation (CPR) and Automated External Defibrillator (AED)" is a video-based, instructor-led course that teaches listeners critical skills needed to respond to and manage an emergency; teaches listeners how to recognize cardiac arrest, get emergency care on the way quickly, and help a person until qualified medical services arrives. Listeners learn duties and responsibilities of first aid rescuers; first aid actions for medical emergencies, including severe choking, heart attack, and stroke; and skills for handling injury and environmental emergencies, including external bleeding, broken bones and sprains, and bites and stings

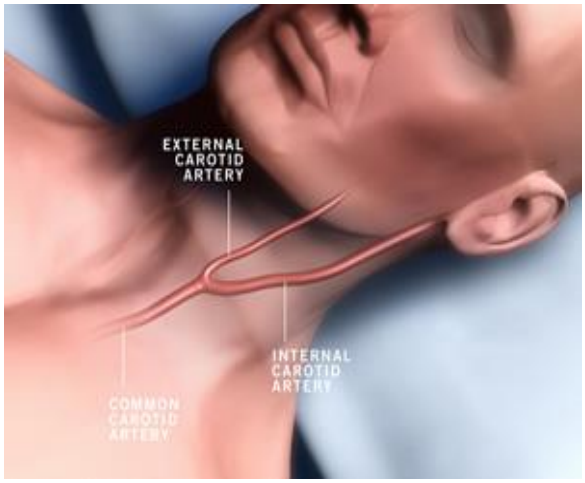
The new training course is based on the American Heart Association "Heartsaver" guideline. It helps to learn when CPR is needed, how to give CPR to an adult and how to use an AED. Certainly, the FA general principles are common for everyone, but in spite of this fact, the FA for seafarers obviously

has some specifics. These peculiarities should be taken into account during the training course implementation and realizing.

The common rule of FA is the strong following to steps of "The Chain of Survival":

- ✓ assessment of scene safety
- ✓ checking for responsiveness
- ✓ shouting/calling/reporting for help
- ✓ checking for normal breathing
- ✓ performing High-Quality CPR with AED (if it is necessary)

The stage of pulse control at the area of carotid artery (*L. Arteria Carotis Externa*) is not mention in this guide. Whereas in the primary survey the circulation of the victim usually is not checked to see if the heart was beating (we assumed that if the victim was breathing, their heart was working and if they were not breathing, their heart was also stopped), the carotid artery is best used on unconscious victims, because the carotid pulse being closer to the heart and is stronger, than the radial pulse (Picture 1).



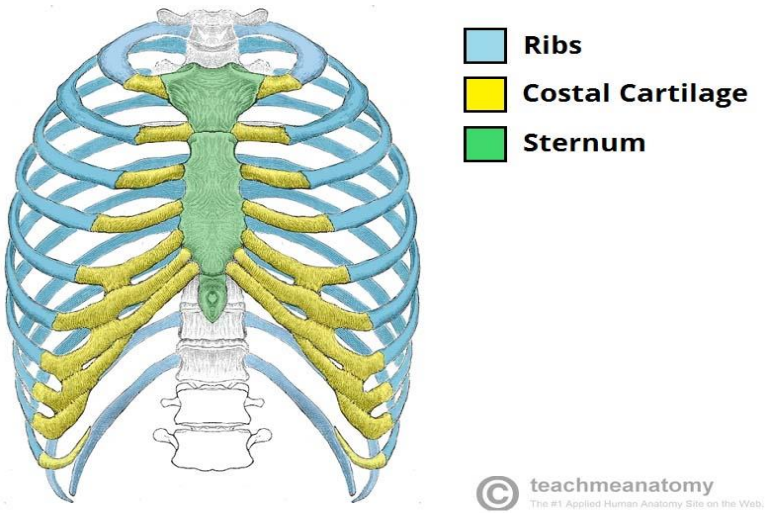
Picture 1. Carotid arteries location

Victim should be placed in supine position, chin elevated to allow easy palpation and yet not enough to tighten the neck muscles. The thumb using for palpation is forbidden, as it is more likely that the examiner will perceive his own pulse if he uses his thumb. Two fingers (second and third) have to be placed in to the indentation to the side of the windpipe, in line with the Adam's apple (on men) (Picture 2). So in monitoring of victim the checking of their circulation is as important as breathing.

Picture 2. Puls control in the area of carotid artery

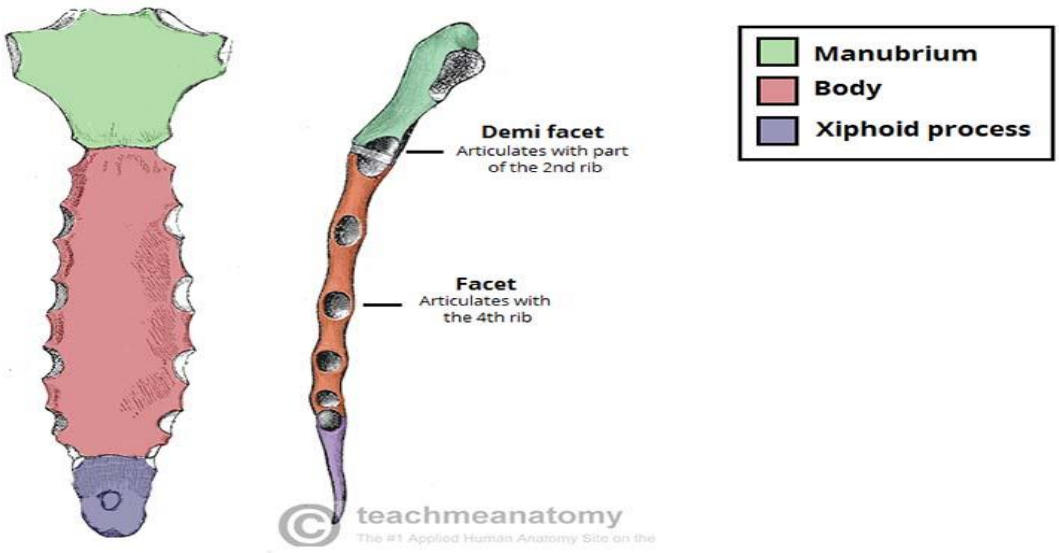
Another important manipulation , which should be done before breath giving is not only the the airway opening, but also the oral cavity examination and any foring things (dentures, vomit mass, chuwing gum, etc) removal.

It is very important to explain and to demonstrate exercises (using the simulator) for the exact area for heart external massage or chest compression. For this purpose it is necessary to discuss the anatomical structure of chest skeleton. First of all the bony and cartilaginous tissue ratio of thoracic cage (*L. Thorax*), which depends on the age of suffered person and his/her musculo-skeletal system individual features. That is why the first compression should be done very carefully as the control to determine the following compressions force and to avoid the ribs (*L. Costae*) fracture (Picture 3).



Picture 3. Rib cage structure

Another important thing is the structure of breastbone (*L. Sternum*), where the xiphoid process (*L. Processus Xiphoideus*) requires some cautions and should not be involved in the compression due to its fragility. So the recommendation of four fingers applying on the xiphoid process area should be done, and the working area of the breastbone body (*L. Corpus Sterni)* and manibrium *(L. Manibrium Sterni)* should be outlined exactly (Picture 4), that is the principal hands position during the CPR (Picture 5).



Picture 4. Sternum

Picture 5. CPR

It is very important to explain the hand position during the CPR and to exercise this position using the simulator. Hands have not to be crossed-crossed. To maximize the force of compressions, the rescuer's hands need to be straight over each other (Picture 6).

Picture 6. Hand position during CPR

And finally, during the CPR performing with AED it is very important to place the pads so that do not attached them and the cables during the compression to avoid the displacement and damaging of them (Picture 7).

Picture7. CPR with AED

The exercises with simulators allow to mention all the details, to notice and to discuss all the technical inaccuracies and so to achieve the mail goal of training – provide listeners with knowledge and skills for high quality CPR. The better the CPR skills are performed, the better the chances of survival.

In December 2018 a pilot course was performed as validation before the operational phase to see that all requirements for intended use are met. Verification was performed in accordance with established internal regulation procedures to ensure that the outputs have met the input requirements. Verification as the confirmation, through provision of objective evidence, that specified requirements are fulfilled is one of the main stages of internal quality assurance of BSMA. Prior to release the training course enables verification against the design and development requirements.

Internal verification ensures that the course is internally assessed and verified. It covers assessment instruments that are fit for the purpose, assessed accurately to standard, judge learner evidence against the assignment criteria, utilize consistent assessment across the program. Prior starting the course in order to verify the suitability and effectiveness of the STCC's training/education course for seafarers the internal verification process was conducted, including checking accurateness program details, assessment criteria, assessment criteria targeted against each task, clearly states what evidence the learner needs to provide, uses suitable terminology and clear demonstration and presentation format.

Verification typically comprised a complete checking of the facilities, teaching aids, instructional materials, review of completeness of the course program. The training provider planed and controlled the development of training / educational course, managed the interfaces between the different groups involved in the development to ensure effective communication and clear assignment of responsibility, such as project plan, establish input requirement, course plans and description, detailed syllabus, teaching and learning materials, handouts, evaluation material, assessment material, completion and documentation.

Conclusions

1. The IMO Model-Courses 1.13" Elementary First Aid", 1.14 "Medical First Aid" and 1.15"Medical Care" for the seafarers are very effective, but not enough for full value First Aid for the current period.

2. New Model-Course "First Aid with Cardio-Pulmonary Resuscitation (CPR) and Automated External Defibrillator (AED)" allows to master the new approaches to First Aid using the AED to help the suffered persons timely and in effective manner.

3. Some worked out details of new training course made it much more adapted, itemized and allow to explain some practical questions within the standard requirements for the implemented of training.

4. High-quality of CPR teaching and learning is the best guaranty of good knowledge and skills that may help save a life.

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THE IMPORTANCE OF SEA PORT IN GEORGIAN ECONOMY

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Abstract
Due to the strategically important geographical location, Georgia has a key transit function throughout the Caucasus and beyond. Because of this, improvement of transport infrastructure and transport means is an essential precondition for the economic and social development of the country. Engagement in transport and communications networks will open up new opportunities for Georgian citizens and businesses to promote economic growth of the country: Georgia becomes one of the major centers connecting two large markets - Europe and Asia transport corridor.
Keywords: port, transport, transit, infrastructure, networks, corridor

Due to the strategically important geographical location, Georgia has a key transit function throughout the Caucasus and beyond. Because of this, improvement of transport infrastructure and transport means is a necessary precondition for the economic and social development of the country. Engaging in transport and communications networks will open up new opportunities for Georgian citizens and businesses and promote economic growth of the country: Georgia becomes one of the major centers connecting two large markets - Europe and Asia transport corridor. Despite the advantages of the Batumi sea port, in particular:

- The port is located in a natural deep water area that gives the possibility of receiving large ships;
- Well protected from the coast;
- There is no need for a channel to enter the port, which frees the fleet from tax fees.
- Batumi Port is an important link to the Europe-Caucasus-Asia Corridor, which originates in Europe and after Bulgaria, Romania, and Ukraine, via the Black Sea connects Caspian Sea countries - Azerbaijan, Kazakhstan, Turkmenistan, etc.
- The port is also used as a major transit port for processing oil and gas from Kazakhstan and Azerbaijan.
- There are some factors that prevent the attraction of the cargo:
- Relatively low rates of development of Georgia's transport system;
- Low quality of transport borders within the country. Low speed of transit transportation, technically obsolete rolling stock;
- Physical deprivation of basic capital, transport infrastructure, Physical obsolescence of market objects;
- The value of border and customs service at the border points of the country and the duration of service, the overdue on the border;
- The complexity of the transit cargo registration procedure, transit cargo level of reliability losses;
- Inadequate activity of the country in relation to the international conventions of transit burden;
- Political and economic stability. Stability of the regulatory documents regulating traffic movement, mobility and regulation of traffic regulation with western standards;
- Insufficiently flexible tariff policy and changes in competitive routes.

Most of the listed internal factors have a systemic character.

The problem lies in the fact that the port is only one component of transit freight service, along with the railway transports of Georgian Railways and Motor Transport, Customs and Border Points, Roads and their Capacity. The efficient work of the port in this cycle will not be able to fully achieve the final result, so the solution of the problem requires a complex approach and activation of the state transport policy, which should ensure the agreed and coordinated work of all participants in the transport chain. In this regard, it is necessary to implement a common tariff policy and regulate them in general interest. A similar approach is in regards with competitive transit route.

Georgia needs a new strategy of creating the management system, based on a complex approach. In the management of the Ministry of Economy and Sustainable Development, the previously united transport administration could have had a positive role in this direction and needed more coordination mechanisms, although there took place vice versa process. The unified transport administration has been disassembled and the transport rights agencies have been established on equal grounds by the transport agencies. Accordingly, the Maritime Transport Agency does not possess any leverage on the railway carrier's tariffs and speeds. Ensure the synchronization of transit cargoes from the railway transport, as well as the railway does not have any impact on the cargo that is included in the port, but in most cases the information is delayed. Therefore, the necessity of warehousing in transit cargo terminals is created, which increases the cost and speed of transit transportation.

Directions of the ports development, due to the complexity of the country's transport system and the overall improvement of the situation, may be formed as follows:

1. Measures for simplification of tariff and customs policies. Determination of tariffs is necessary to assess the value of transport and other types of interest and terminal services. Ukraine's researchers have also pointed to the implementation of such policies, which in turn seek to increase the transit potential of their country.
2. In the post soviet countries, the second direction of ports development is the privatization of sea ports. Sea ports of Georgia are privatized to foreign companies today-they have been given for long-term management rights, but there is no tangible effect on the transit volume turnover. No large investments have been made for modern capital upgrading and pier modernization;
3. Ports management reorganization in accordance with West State Ports So that the automated systems of processing and transmission of information should be fully utilized in close coordination with the analog data of other types of transport;
4. Increase investment potential in ports, which is achieved through Georgia's overall macroeconomic measures. First of all, liberalization of the tax system, by improving banking and credit system, by improving market infrastructure. Russian and Ukrainian researchers are trying to set similar demands.
5. Good use of transit potential is the importance of coordinating Georgia's transportation with the transport of neighboring Azerbaijan state as transit cargo of Azerbaijan and the Central Asian countries is determined by the Caspian Sea ferry and railway service on the territory of Azerbaijan. Therefore, it is necessary to implement the agreed tariff and technical policy.

From the importance of sea ports and on the trans-Caucasian highway, it is necessary to create logistical centers that provide rational connections between cargo owners and cargo handlers, thus the process will be much better.

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1. Page Layout (paper size A4 - 21 cm x 29,7 cm) should be as follows: Top – 3 cm, Bottom – 3 cm, Left – 3 cm, Right – 3 cm.
2. Manuscripts should be prepared using Microsoft Word programme (not older than Microsoft Word 2000).
3. Minimum length for the article is 6 pages, maximum length - 10 pages.
4. No page numbering.
5. Text should be typed using font Times New Roman and be single-spaced. New paragraph should be started with indentation 0,75 cm from the left margin.
6. The article should include these sections:
   – title;
   – author's name(s) and information (organisation, city, country, address, phones, and e-mail addresses);
   – abstract (100–150 words);
   – keywords (max. 5);
   – introduction – explaining the nature of the problem, goal and tasks of the research, research object, previous work, contribution of the research, research methods;
   – description of research;
   – conclusion section (mandatory!) which should clearly indicate advantages, limitations and possible applications;
   – references.
7. The text of the article should be prepared in English (spelling – British English).
8. The title of the article – 14 point, UPPERCASE, style Bold and centered.
9. Author's names – centered, type size 12 point, Upper and lower case, style Bold Italic.
10. Author's information – 10 point, Upper and lower case, style Italic, centered.
11. Abstract and keywords – 10 point size, style Normal, alignment Justify.
12. The first level Headings – 11 point, Upper and lower case, style Bold, alignment Left. Use one line space before the first level Heading and one line space after the first level Heading.
13. The second and third level Headings – 10 point, Upper and lower case, style Bold, alignment Left. Use one line space before the second level Heading and one line space after the second level Heading.
14. Text of the article – 10 point, single-spaced, alignment Justify.
15. The set of formulas on application of fonts, signs and a way of design should be uniform throughout the text. The set of formulas is carried out with use of editors of formulas MS Equation 3.0 or MathType.
16. The formula with a number – the formula itself should be located on the left edge of the text, but a number – on the right.
17. Font sizes for equations are: 11pt – full, 7pt – subscripts/superscripts, 5pt – sub-subscripts/superscripts, 16pt – symbols, 11pt – subsymbols.
18. All Figures – must be centered. Figure number and caption appear below the Figure, type size 9 point.

Figure 1. This is an example

19. Diagrams, Figures and Photographs – must be of high quality, в in format *.TIFF, *.JPG, *.BMP with resolution not less than 300 dpi. Also formats *.CDR, *.PSD are possible. Combination of Figures in format, for instance, *.TIFF with elements of the in-built Figure Editor in MS Word is prohibited.
20. Table Number and Title are above the Table. Alignment Left. Type size 9 point. Use one line space before the Table Title, one line space after the Table Title and one line space after the Table.
21. References in the text should be indicated by a number in square brackets, e.g. [1]. Numbered list of references and quoted literature is presented at the end of the article in the alphabetic order. The correct format for references is the following:

21.1. Articles:
Panagoulia**,** D., Dimou, G. Sensitivity of flood events to global climate change. Journal of Hydrology, Vol. 191, Issue 1, 1997, pp. 208-222.

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21.3. Conference proceedings:
Andrejeva, D. The air pollution prevention from ships. In: Maritime Transport and Infrastructure. Proceedings of the 12th International Conference (Riga, Latvia, April 29-30, 2010, Latvian Maritime Academy), 2010, pp. 84-86.

22. If the number of authors of an article, a book or a paper published in the conference proceedings exceeds three, the first author is indicated and followed by «et. al.» For example, the format for article is the following:
Wang, J., et. al. Safety based design and maintenance optimisation of large marine engineering systems. Applied Ocean Research, Vol. 18, Issue 1, 1996, pp. 13-27.
23. All papers will be reviewed by two reviewers. All authors have to provide one review from their own country (signed, scanned and sent by e-mail in pdf format) along with the paper. The other reviewer will be provided by the Journal Editorial Board. Once referee evaluation forms have been returned we will contact you with regards to the position of your paper. In some cases the referees will suggest amendments which the author will be asked to attend to before the paper is suitable for publication.
24. Articles poorly prepared or incorrectly formatted may not be published in the Journal.