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| IALA Guideline |

1???

The HUMAN FACTOR IN VTS

Edition 1.0

Document date

Revisions to this IALA Document are to be noted in the table prior to the issue of a revised document.

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| Date | Page / Section Revised | Requirement for Revision |
| month/year approved by Council | aaaaa | aaaaaa |
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# INTRODUCTION

Human Factors can be considered on different levels: the System Level and the Human Performance Level. The design of procedures and equipment must meet certain requirements on a system level in order to be used by the VTSO. This document will consider the Human Factor including the system level:

* Human Factors on the System Level addresses questions such as “How do I design the HMI?”, “How many operators do I need?”, “What happens if the system fails”, “How do I train the operators?” and “How do I certify them?”, “Who should be responsible for a specific task”, “How do I make sure the operators work as a team?”, “How can I avoid loss of skills?” Human Factors on the System Level takes very much a top-down perspective.
* Human Factors on the Human Performance Level addresses questions such: “Is the operator aware of what’s happening?”, “How to make sure the operator is not overloaded?”, “What is the effect of stress on work and beyond?”, “How reliable will the operator work?”, “How can I reduce the effects of errors?”, “Does the user trust the system?”, “Which information does the user need to solve a problem?”. This level corresponds to a bottom-up perspective.

The SHEL-model below shows how the Human Factor interacts with software, hardware and his environment. The environment of the VTSO will typically contain several procedures, that may or may not conflict each other. He may work with several pieces of hardware providing the same or conflicting information. In the environment may be several factors which reinforce or weaken each other.

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**L**

S = Software (procedures, rules)

H = Hardware (equipment)

E = Environment (legislation, geographical environment)

L = Liveware

Of interest is the interaction with Liveware. Liveware deals with all the equipment available and multiple procedures in a complex and ever changing environment.

The aim of this document is to create awareness on Human Factor issues and their role in the every day operation. Thus enabling the vts-authority to develop equipment, procedures and other issues from the Human perspective.

Another goal is to provide the vts-authfority with tools to manage and thereby improve the performance of the Human Factor.

## 

## Strucure of the document



This document contains 6 chapters, divided into sub-chapters??? Below you find the setup of this document.

1. HUMAN PERFORMANCE

Situational Awareness

Attitude

Commitment

Abstract Thinking

Stress

Fatigue

Complacency

Health and Safety

Distraction

Decision Making

Error/Conflict Management

Communication

Working with IT

Multi-Tasking

Teamwork

Workload

Vigilance

Complexity of Tasks

Procedures

Processes

Assigned Duties

1. ERGONOMICS & EQUIPMENT

Faros input document

Scanning information

Colours, displays, alerts and so forth

Clothing Uniforms???

User friendly design

Human-Machine Interface.

1. ENVIRONMENT

Work space

Light, noise, furniture, climate

Fairway, traffic, current, weather and so forth

Food????, adequate facilities

1. PROCEDURES

Communication

SOPs (both routine and emergency)

Health and Safety

Medical standards

Working hours, Shifts, Rest hours

How long screen work

Reporting incidents and accidents

1. ORGANISATION ROLES AND RESPONSIBILITIES

Staffing

Selection

Training, Education & Certification

Appraisal & Assessment

Quality management system (audits)

Safety management system

Safety culture

Housing, equipment & availability

1. TRAINING AND DEVELOPMENT

Training road map

Appraisal

Team development

External courses (development)

Reference to V103/5

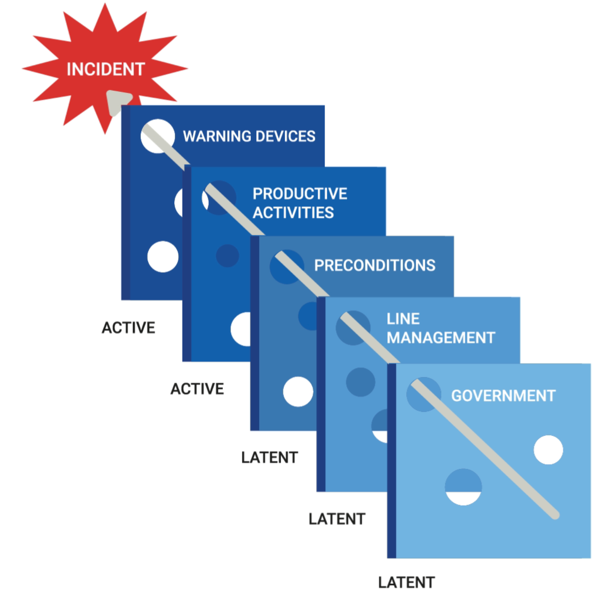
# human performance

1. Decision making.

The VTSO will take multiple decisions during the day. He decides on how to provide his information and what vessels require priority and what vessels do not. The decision making process contains several steps:

A VTSO applies this process numerous times a day, without any problem. However, sometimes the result is not as expected and undesired. Even the most experienced VTSO may can make a mistake in any of the mentioned steps. So what causes a VTSO to make mistakes and can he do something to prevent this?

The VTSO needs to create a good situational awareness. The first step is to view the situation. Sometimes the operator may simply overlook the situation developing, or miss a ship. A good scanning technique can avoid these problems. However, the scanning of the screens is hardly ever a part of VTSO training. In order to improve the first step teaching scanning techniques is highly recommended. The second step is normally part of the training. Sometimes training programmes deal with the ideal situation, and the operator will learn deviations as he goes along on the work floor. The training programme should contain possible disturbances in the provision of information, such as cluttering on the radar, ghost echos and also possible conflicts in information and how to deal with that. Furthermore training situations should be developed so that problems can be resolved in different ways, thereby providing a best way as the vts-authority sees fit and complies to their policies. Discussions on how choices are made in a group of VTSO’s can be beneficial to enhance awareness on step 4, how evidence is weighed and which variables should gain preference. The VTSO will now have to choose a preferred alternative, his choice of action. In the next step he will execute that action. Sometimes the VTSO does not act when there is an incident. Uncertainty and fear of consequences may fuel passive behaviour. However, this does not decrease the liability of the VTSO. The last step is often not executed. The VTSO whose work consists of making numerous decisions a day hardly ever takes the time to review if another outcome would have been better. There may be a task for the management to help a VTSO analyse a situation. It is preferred to do this regularly especially when the VTSO took a good decision. This will build his confidence. Analysing a situation should not be a punishment after taking a wrong decision.

Error management

Why do mistakes happen? Mistakes can happen for a number of reasons. Very often there is not a single source for the mistake, but moreoften there is a chain of events leading up to the incident. James Reason provided us with a good insight regarding the involvement of the entire system in incidents and accidents. Take the first piece of ‘cheese’, government. The Governement will make legislation in order to ensure safe traffic. Since not every future situation can be predicted legislation hardly ever covers every possible occurance. So there are weak spots. The VTS-authority (here referred to as line management), will do the same. They set up policies and rules and procedures to make sure that incidents do not happen. The VTS-authority has the same problem, they cannot predict every possible situations, and so there procedures show weak spots. Than there are preconditions, these are for example the hours of training that the VTSO received, the VTSO’s work and rest schedule and so on. The amount of training may not be sufficient for every VTSO, or people can be fatigued, so this slice also shows weak spots. The productive activities are the actions of the VTSO. People make mistakes. So there are weak spots in this slice. Finally we have warning devices. At least you would hope that there is a device warning you for dangerous situations. These devices may be absent or not working properly. So this layer also has weak spots. An incident or accident will occur when the arrow goes through all the weak spots of all layers. So what can a VTSO do about that? It is the task of the VTSO to make the weak spots in his layer as small as possible. He can do this by creating optimal situational awareness. By making sure that he knows all the legislation, procedures that apply to his work. By making sure that he is well-rested and fully trained for his job. By minimising the weak spots, he is able to create a safe outcome.

Situational Awareness

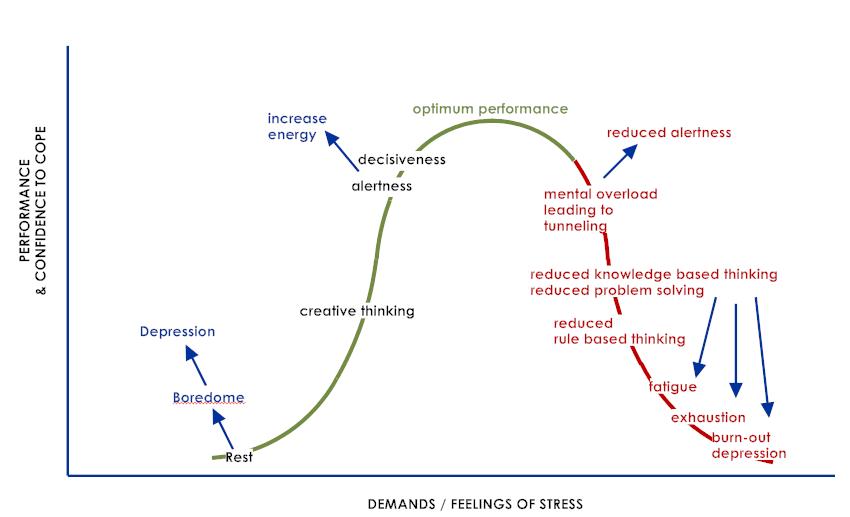
A good situational awareness is essential in order to ensure good decision making. Situational Awareness can be created by :

* Knowledge of legislation
* Knowledge of Standard Operating Procedures
* Sufficient training
* Sufficient rest
* Absense of substances (medication, alcohol, drugs)

On an organisation level Situational Awareness may be decreased by absence of Standard Operation procedures or other means (people and / or equipment / tools). VTSO’s should discuss this with their company management.

Stress

People need stress in order to perform. Incidents can happen in a situation of absence of stress. Stress can be a pleasant sensation and every now and then people seek stressfull situations (scary movy, bungee jumping, racing). If a VTSO has a long and busy day he will get energy as long as everything is under control. Once he fears a loss of control, stress becomes a negative emotion.



Stress has an impact on the ability of the VTSO to make decisions. People act on different levels

Skill based

Rule based

Knowledge based

1. Skill based are activities that we execute automatically. We do not need to think about them. For example walking, skating, bicycling are activities which, once mastered, are executed without conscious processing. These activities are not supposed to be carried out consciously. The advantage is that we can perform several activities at the same time.
2. Rule based behaviour are activities that you can perform almost automatically. If someone asks you how much is 1 + 1 you can say 2, without really giving it much thought. Procedures that are followed regularly fall under this category.
3. Knowledge based activities require thinking. Problem solving is knowledge based. This level is affected the most when you are under stress. People find it hard to think when they find themselves in conditions that create stress. This is why procedures (rule based) can help in stressful situations.

Stressmanagement is an important issue which should be addressed during training, but also during yearly appraisal interviews. Stress is additive. People who face stress in their home environment (e.g. personal or financial problems) should be able to confine to someone in their working place. To provide employees the opportunity to discuss these matters is specifically a management task.

Fatigue

The ability to think is also very much affected by fatigue. Long working hours and shift work contributes to fatigue among VTSO’s.

# training human factors

Awareness of the Human Factor can be created by means of training. It is advised that the recurrent training of VTSO’s contains a certain element of Human Factor Training. In appendix …. you find an example of a training programme.

Training Human Factor should also be part of the simulator and on the job training process.

## (Example Heading level 2)

Body text

1. Geographical range

Where:

*Rg* is the geographical range (nautical miles) (alternatively NM)

*ho* is the elevation of observer’s eye (metres) (alternatively m)

*Hm* is the elevation of the mark (metres) (alternatively m)

### (Example heading level 3)

Body text.

1. Theory of Special Relativity

Where:

*E* is the kinetic energy (Joules) (alternatively J)

*m* is the mass (kilograms) (alternatively Kg)

*c* is the speed of light (metres/second) (alternatively m/s)

#### (Example heading level 4)

Body text.

# Example Heading level 1[[1]](#footnote-1)

Body text. Bullets have only one sentence. Anything further needs to appear in the relevant 'bullet text' style.

* Bullet 1:
* Bullet 1:
* Bullet 1.

## TABLES

Body text

1. Example of a table caption; table with the significant information in the first column

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| Table heading | Table text |
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| Table heading | Table text |
| Table heading | Table text |

1. Example of a table caption; table with the significant information in the first row[[2]](#footnote-2)

|  |  |  |
| --- | --- | --- |
| **Table heading** | Table heading | Table heading |
| Table text | 1. Table List 11    1. Table list a   Table list i | Table text |
| Table text | Table text | Table text |
| Table text | Table text | Table text |
| Table text | Table text | Table text |

Example of ‘normal text’ following a Table

1. Example of a table caption; table with coloured rows

|  |  |  |
| --- | --- | --- |
| Table heading | Table heading | Table heading |
| Table text | Table text | Table text |
| Table text | Table text | Table text |
| Table text | Table text | Table text |
| Table text | Table text | Table text |
| Table text | Table text | Table text |
| Table text | Table text | Table text |

**Note:** Colours for text and cell shading need to be selected from the permitted palette (see ANNEX C)

# FIGURES



1. Example figure caption



1. Another example figure caption

# DEFINITIONS

*Suggested text:* The definitions of terms used in this IALA Guideline can be found in the International Dictionary of Marine Aids to Navigation (IALA Dictionary) at <http://www.iala-aism.org/wiki/dictionary> and were checked as correct at the time of going to print. Where conflict arises, the IALA Dictionary should be considered as the authoritative source of definitions used in IALA documents.

# ACRONYMS

IMO International Maritime Organization (Acronym style)

# REFERENCES

1. Abcd
2. Efgh
4. EXAMPLE OF AN ANNEX - LANDSCAPE

Body text

1. example of ANNEX heading level 1

Body text

* 1. example of annex heading level 2

Body text

* + 1. Example of annex heading level 3

Body text

* + - 1. Example of Annex heading level 4

Body text

1. Example table caption

| No | Title/Topic | IMO References | Requirements | Possible Audit Questions | Remarks |
| --- | --- | --- | --- | --- | --- |
| 1 | Table text | Table text | Table text | Table text | Table text |
| Table text | Table text |
| Table text | Table text |

1. EXAMPLE OF AN APPENDIX TITLE
2. APPENDIX HEADING 1

Body text

* 1. APPENDIX HEADING 2

Body text

* + 1. APPENDIX HEADING 3

Body text

* + - 1. Appendix Heading 4

Body text

1. (EXAMPLE ANNEX TITLE)
2. Introduction (Example Annex Heading 1)

Body text.

* 1. Example of ANNEX HEADING Level 2

Body text

* + 1. Example of annex heading level 3

Body text

* + - 1. Example of Annex heading level 4

Body text

1. PERMITTED COLOUR PALETTE

The IALA colour palette is divided in 3 palettes of different level of hierarchy that has to be respected.

Corporate colours (Not shown)

IALA’s corporate colour palette is directly inspired from the colours in our logotype:

* dark blue
* white
* yellow
* gradient blue

Primary & secondary colours

The primary colours are to be applied in complement with the corporate colours.

This second level of colours gives rhythm and helps to segment our publications.

The secondary colours are used to highlight information, titles in a minor proportion only.

These colours can’t be replaced by other tints.

**PANTONE PROCESS CYAN C CMYK :** C 100

**RGB :** R 0 - G 159 - B 223

**CMYK : 50 % OF THE TONE RGB :** R 131 - G 208 - B 245

**CMYK : 50 % OF THE TONE RGB :** R 148 - G 217 - B 213

**CMYK : 50 % OF THE TONE RGB :** R171 - G 219 - B 233

**CMYK : 50 % OF THE TONE RGB :** R 178 - G 193 - B 237

**PANTONE 326C CMYK :** C 81 - Y 39

**RGB :** R 0 - G 175 - B 170

**PANTONE 7703 C**

**CMYK :** C 79 - M 2 - Y 10 - K 11

**RGB :** R 0 - G 181 - B 208

**PANTONE 660 C CMYK :** C 88 - M 50

**RGB :** R 64 - G 126 - B 201

**CMYK : 20 % OF THE TONE RGB :** R 212 - G 237 - B 252

**CMYK : 20 % OF THE TONE RGB :** R 213 - G 240 - B 237

**CMYK : 20 % OF THE TONE RGB :** R 216 - G238 - B 245

**CMYK : 20 % OF THE TONE RGB :** R 218 - G 223 - B 246

**PANTONE 258 C CMYK :** C 51 - M 79

**RGB :** R 153 - G 80 - B 159

**CMYK : 50 % OF THE TONE RGB :** R 201 - G 169 - B 208

**CMYK : 50 % OF THE TONE RGB :** R 183 - G214 - B 155

**CMYK : 50 % OF THE TONE RGB :** R 246 - G 174- B 135

**CMYK : 50 % OF THE TONE RGB :** R 157 - G 157 - B 156

**PANTONE 739 C**

**CMYK :** C 78- Y 95- K 5

**RGB :** R82 - G 174 - B 50

**PANTONE 2347 C**

**CMYK :**M 88 - Y 100

**RGB :** R 230 - G 56 - B 17

**PANTONE COOL GRAY 11 C CMYK :** K 100

**RGB :** R 87 - G 87 - B 86

**CMYK : 20 % OF THE TONE RGB :** R 232 - G 221 - B 288

**CMYK : 20 % OF THE TONE RGB :** R226 - G 238 - B 217

**CMYK : 20 % OF THE TONE RGB :** R 253 - G 224- B 208

**CMYK : 20 % OF THE TONE RGB :** R218 - G 218 - B 218

**CMYK : 10 % OF THE TONE RGB :** R 237 - G 237 - B 237

Guideline

Recommendation

Model Course

PRIMARY COLOURS

SECONDARY COLOURS

1. Example footnote [↑](#footnote-ref-1)
2. Example of footnote [↑](#footnote-ref-2)