REPORT BASED ON A TRAINING SEMINAR ON THE USE OF THE IALA RISK MANAGEMENT TOOLBOX

DATE: 20TH - 24TH MAY 2019
LOCATION: IALA HEADQUARTERS, SAINT GERMAINE-EN-LAYE, FRANCE

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This report is based on the seminar of the IALA Risk Management Toolbox - IWRAP MkII; PAWSA MkII, SIRA and; Simulation, in waterway planning which was held during 20th – 24th May 2019, at the IALA Headquarters in Saint Germaine-en-Laye, France. This report provides details of the Seminar and a list of participants.

1.0 Background and Aim

The training seminar on the use of the IALA Risk Management Toolbox was held during 20th – 24th May 2019, at the IALA Headquarters in Saint Germaine-en-Laye, France (refer to Annex A for the programme). The aim of the seminar was to present participants with the concepts of risk management, the importance of stakeholder liaison and the value of the four IALA Risk Management Tools: IALA Waterway Risk Assessment Program (IWRAP MkII); Ports and Waterways Safety Assessment tool (PAWSA MkII); Simplified IALA Risk Assessment (SIRA) and; Simulation, in waterway planning. Discussions during the seminar were based on the following:

i. IALA Standard S1010 – Marine Aids to Navigation Planning and Service Requirements
ii. IALA Recommendation R1002 – Risk Management for Marine Aids to Navigation
iii. IALA Guideline 1018 – Risk Management
iv. IALA Guideline 1058 – The use of simulation as a tool for waterway design and AtoN planning
v. IALA Guideline 1123 – The use of IWRAP Mk2
vi. IALA Guideline 1124 – the use of PAWSA
vii. IALA Guideline 1138 – The use of SIRA

This Seminar was attended by 20 participants from 14 countries (refer to Annex B for a list of participants). Each participant benefited from experiential learning during the theoretical and practical training delivered by world experts, in different aspects of the Toolbox. Upon successful completion of the seminar, participants gained the knowledge and skill needed to use IWRAP MkII within their organisations, organise a PAWSA MkII or SIRA seminar and recognize the benefits of applying Simulations to develop effective AtoN waterway designs and therefore reduce risks in maritime navigation.

2.0 Progress of the Seminar

Day 1 – Monday 20th May 2019

Session 1 - Opening Ceremony and Introduction to IALA and the IALA WWA and international obligations under SOLAS

Lecturers: Mr. Francis Zachariae – Secretary General of IALA, Mr. Kevin Gregory – Education Training and Development Manager of IALA, and Mr. Omar Frits Eriksson - Deputy Secretary-General / Dean of IALA

Opening ceremony

The Seminar was formally opened by Mr. Francis Zachariae – Secretary General of IALA who explained that the focus of the week is to impart the knowledge and skill to participants, that is needed to apply the IALA Toolbox, which can be used to measure risk. He explained that a measure of risk is needed for risk management, as it relates to the provision of AtoN and VTS, as stated in the SOLAS convention. A safety briefing and programme for the Seminar was presented by Mr. Kevin Gregory – Education Training and Development Manager of IALA. Mr. Omar Frits Eriksson - Deputy Secretary-General / Dean of IALA then presented IALA's Standards to the participants. He explained that the Standards are an integrated framework which gives references to guidelines and recommendations. The opening ceremony concluded with all participants and lecturers introducing themselves.

Introduction to IALA and the WWA

Mr. Eriksson explained the background, achievements, functions, and ongoing work of IALA, whose motto is to ensure: "successful voyages, sustainable planet". He highlighted that IALA's membership is steadily increasing, particularly among industrial members. Mr. Eriksson explained that IALA has four committees which are responsible for the publication of IALA's Standards, Recommendations, Guidelines, Manuals and Model courses. He informed the participants that the IALA WWA (established in 2012 based on sponsorship) was created to facilitate education and training, capacity building and research and development. Mr. Eriksson explained how the WWA selects the coastal states which need their assistance and the level and type of assistance required. He explained IALA's accreditation scheme, listing the countries which received training and those are now available to provide training. Mr. Eriksson then said that IALA is in the process changing their status from NGO to an IGO. He explained the benefits of becoming an IGO and asked the participants to encourage their Nations to support the change of IALA's status to an IGO, at the upcoming Diplomatic Conference in 2020.

Coastal State Obligations - SOLAS

In a subsequent lecture, Mr. Eriksson explained the obligations of Coastal States under the SOLAS convention, focusing on the importance of SOLAS Chapter V Regulation 13. This Regulation relates to the establishment and operation of Aids to Navigation (AtoNs), as well as the IMO SN.1/Circ 296 which endorsed the IALA Risk Management Toolbox.

Session 2 – Introduction to the IALA Risk Management Toolbox
Lecturer: Mr. Omar Frits Eriksson - Deputy Secretary-General / Dean of IALA

Mr. Eriksson explained the terms 'risk' and 'navigational risk', then introduced the four components in the IALA Risk Management Toolbox and the theoretical background of each. He then highlighted that IWRAP MkII focused only on the probabilities of groundings and collisions, not the consequences. Unlike IWRAP MkII, PAWSA MkII and SIRA considers both probability and consequence, using a methodical analytical approach to the management of risk. Simulation in risk management is a combination of traditional ship simulators and numerical navigators. Mr. Eriksson pointed out the importance of the development of AIS data, as it is a very valuable tool to know the volume of traffic and to know the behavior of vessels.

Session 3 – Case Study of the use of IALA Risk Management Tools
Lecturer: Captain Roger Barker – Director of Navigational Requirements at Trinity House

Captain Barker reinforced Mr. Eriksson's explanation of SOLAS Chapter V Regulation 13. The topics of his presentation covered PAWSA MkII as a qualitative ports and waterways safety assessment tool, IWRAP MKII as a quantitative tool and Simulation. Using examples from the UK, he showed how AIS plots, contour delimitations, AtoN overlays and IWRAP MkII can be used to present risk mitigation measures (such as routing measures) to governmental authorities, when considering the geographical locations of infrastructure such as offshore windfarms. He explained how the combination of expertise in a qualitative approach together with a detailed quantitative risk assessment can provide for a significant demonstration of the requirements for appropriate risk mitigation. The value of an appropriate risk assessment, to determine the risk presented and provide a detailed record of the decision process was emphasized. He concluded by reminding participants of other considerations such as AIS carriage requirement by non-SOLAS vessels, different risks/causation factors applied for different classes of vessels, and the value of local "qualitative" knowledge. This regional case study was very useful to understand the important relationships among the different risk assessment tools, and how the respective tools can be used to consider mitigation measures for specific issues. The participants were very interactive during Captain Barker's lecture.

Session 4: IWRAP Mk 2 Development and Principles
Lecturer: Mr. Omar Frits Eriksson – Deputy Secretary-General / Dean of IALA

Mr. Eriksson introduced the concepts of the basic risk equation: risk = probability x consequence. He then gave an overview of the principles of each tool in the IALA Risk Assessment Toolbox and compared their concepts and applications. More specifically, Mr. Eriksson explained that IWRAP MKII is a quantitative approach to risk assessment, it is a probabilistic algorithm which does not calculate consequences of an accident and it is scenario based. He then proceeded to give an overview of the principles of IWRAP. Mr. Eriksson explained then explained the concepts of PAWSA, highlighting that it is a qualitative approach, based on expert knowledge and discussions/opinions. He then explained that the results of IWRAP can be used as an input in PAWSA, to guide discussions. Unlike IWRAP MKII, PAWSA determines both probability and consequences of accidents. Mr. Eriksson explained that SIRA is a qualitative approach, based on expert knowledge and uses the basic risk matrix of probability versus consequence. He explained that like PAWSA, SIRA determines both probability and consequences of accidents, he then gave an overview of the principles of SIRA and Simulations.

Using another PowerPoint, he provided greater detail of the evolution, development and principles, assumptions and data requirements of IWRAP MkII. He explained that it was based on defined traffic "legs", each of which uses a probability curve to determine the lateral traffic distribution. A traffic separation scheme would show clear offsets between sets of distribution curves for traffic steaming in each lane. Traffic density plots are developed for small (e.g. 100m x 100m) squares using historical AIS data with higher densities shown in red, and fewer ships in lighter colors. The purpose is to predict the annual number of collisions and groundings on each leg. He explained that human "causation" factors (Pc) are used to weight the calculation of accident frequencies. He proceeded by explaining the rationale behind the analysis of powered and drifting groundings and categories of collisions. Participants from both Brazil and the Netherlands explained that 1 out of every 1,000 ships experience a blackout while transiting their territorial waters. Mr. Eriksson explained the quality of AIS data that is required for assessment in IWRAP, and shortcomings in the data that the software can compensate for.

The following Sessions were rescheduled:
Session 5 – SIRA development and principles of SIRA test case
Session 6 – Practical Application of IWRAP MkII

Welcome Reception
A welcome reception was hosted by IALA at the IALA Headquarters.

Day 2 – Tuesday 21st May 2019

Session 7 – PAWSA MkII – Development, Principles and use of Workbooks
Lecturer – Mr. Mahesh Alimchandani, Head of Navigation, Navigation Safety and International Relations

The aim of Mr. Alimchandani's presentation was to give a background of PAWSA, its goals and explain how it should be conducted. He began his presentation by explaining that, while risk assessments are done, there should also be a culture of safety. To illustrate this, he showed a video of the tragic loss of the AF 447, explaining that safety is the mainstay of the team which designed the aircraft, but the loss was due to the design of the aircraft and skill of the least experienced pilot who was flying the aircraft. Mr. Alimchandani then reinforced the theories of risk and risk management of PAWSA, as it relates to IALA's Standards and regulations outlined by the IMO. He reinforced the similarities and differences among the tools of the IALA Risk Assessment Toolbox. He then delivered an introduction of PAWSA by giving an overview of the PAWSA waterway risk model, explaining how it is a structured approach to risk assessment, introducing the Delphi method and highlighted the strengths of PAWSA.

In a subsequent lecture he gave a detailed explanation of the 24 risk factors of the PAWSA risk factors which includes 4 probability categories: vessel conditions, traffic conditions, navigational conditions and waterway conditions and 2 consequence categories: immediate consequences and subsequent consequences. He highlighted that the 24 risk factors are a guideline for discussion among the invited stakeholders and that the risk factors can be customized. It should be noted that very few changes have been made by facilitators while conducting a PAWSA. Mr. Alimchandani highlighted that a good trained facilitator is fundamental to conducting a successful PAWSA. Participants were interactive during this lecture - this was encouraged.

During a third lecture, Mr. Alimchandani explained the PAWSA Implementation Guide. With reference to the PAWSA Excel Spreadsheets, he introduced PAWSA Workbooks: 1 – evaluates team expertise, 2 – setting risk factor rating scales, 3 – baseline risk levels (describes the conditions of the waterway), 4 – mitigation effectiveness and 5 – additional mitigations. Throughout the lecture, Mr. Alimchandani highlighted that Workbook 2 is applied only if required.

A group photo was taken following the lunch break.

Session 8 – Test Case PAWSA MKII
Lecturer – Mr. Mahesh Alimchandani, Head of Navigation, Navigation Safety and International Relations
Mr. Alimchandani then discussed how a PAWSA was carried out for Gladstone. He explained why PAWSA was selected to assess maritime risk across Gladstone, then explained that preparation was key to the

success of the seminar. He explained that the facilitator started preparing stakeholders for the seminar 60 days in advance, prepared 'read ahead' reference material for the participants and defined the role of each member of the seminar. Mr. Alimchandani explained that the seminar took two full working days of working with 15 teams with 2 people each; who were carefully selected. He also illustrated how the room was set up for maximum productivity during the seminar. He presented the outcomes of each workbook and explained how the recommendations for risk mitigating measures have been implemented; he highlighted that there was a measurable decrease in risks across the study area. In closing the lecturer outlined post-seminar methods which should be carried out for example: quality assurance checks on the workbooks and feedback on the proceedings of the seminar.

Session 9 – Use of Simulation in Risk Management
Lecturer: Professor Knud Benedict, Professor at the Maritime Dept. of Wismar University in Rostock/Germany

Mr. Knud Benedict began his lecture with a presentation on the Use of Simulation in Risk Management, definitions and samples. He gave background information about his former work field in the Maritime Simulation Centre Warnemünde and its projects. The definition of simulation was explained, and Mr. Benedict listed the relevant IALA publications about simulation. He continued with the definition of simulation, areas of application, the importance and purpose of simulation. The role of simulation in Risk Management for Maritime Systems & Processes was explained in principle and specifically for the ship risk and the risk in waterways and ports. Samples for Application of Maritime Simulation, Methods & Results were then given. Lastly, specific samples for Waterway and Accident Investigations and samples for Risk Management in Ship Operation were explained in detail.

Participants were introduced to IALA's shared learning platform: https://learning.iala-aism.org

Day 3 – Wednesday 22nd May 2019

Session 5 – Development and Principles of SIRA Test Case
Lecturer: Mr. Kevin Gregory – IALA Education and Development Manager

Mr. Gregory commenced his lecture by explaining that Simplified IALA Risk Assessment (SIRA) was created with developed and developing nations in mind. He went on to explain how it relates to international regulations and guidelines. Mr. Gregory explained the key concepts of the SIRA, which includes hazards, types of undesired scenarios and consequences, and the relationship among these concepts. Using case studies, he listed the considerations to be taken in account when selecting the zones for a SIRA assessment and then moved on with explaining what the most common unwanted scenarios are. Examples were given of Risk Control Options and the Risk Value Matrix was analyzed. The participants were made aware that

it is the responsibility of each CA to develop their own MS Excel or other formal records. The IALA WWA template is an example only and does not form part of Guideline G1138.

In a subsequent lecture, Mr. Eriksson provided a comprehensive explanation of 'transmissivity', while referring to the definition on IALA's wiki page. Mr. Eriksson then gave an overview of the technical aspects of IWRAP and guided the participants to install the software.

Session 10 – IWRAP MkII Modelling
Lecturer – Mr. Omar Frits Eriksson – Deputy Secretary-General / Dean of IALA

Assisted by Mr. Per Christian Engberg - Chief Architect at Gatehouse Logistics, Captain Roger Barker, and Ms. Dawn Seepersad, Mr. Eriksson guided participants through the process of creating a basic IWRAP MkII model, using training data across Hatter Barn. It should be noted that participants had difficulty when specifying the 'ship type' during the exercise. Also, participants incurred a license error which was quickly fixed by Mr. Engberg. To compensate participants for this error, the licensing period was extended for the participants.

Session 12 – SIRA Case Study
Lecturer – Mr. Minsu Jeon – IALA Technical Operations Manager

Mr. Jeon began his lecture by introducing challenges in maritime navigation due to the geographical distribution of the South West Pacific Region, he also explained why safe and efficient navigation is needed across the region. He explained that Fiji does not follow IALA's guidelines for AtoNs; they follow a national regulation. The type, quality and extent of AtoNs across Fiji are insufficient and ineffective. He continued by explained the benefits of conducting a risk assessment of the AtoNs across Fiji and explained how a SIRA seminar was conducted across Kiritimati, Kirbati. Mr. Jeon went on to explain that the likelihood of an accident in the region is low, because of the frequency of traffic however, the consequences of an accident can be severe; affecting the environment, culture and economy. He then explained how the implementation of AtoNs would reduce consequences on an unwanted event.

Session 10 continued – IWRAP MkII Modelling
Lecturer – Mr. Omar Frits Eriksson – Deputy Secretary-General / Dean of IALA

Mr. Eriksson continued by looking in at the Hatter Barn Case in greater detail for example, he explained how to copy traffic from one leg to another and how to create grounding scenarios. Participants were asked to complete the model for the Hatter Barn area.

Presenter: Mr Wilhelmus DE POOTER from Rijkswaterstaat Zee & Delta in the Netherlands

Mr. De Pooter introduced the work being done at Rijkswaterstaat Zee & Delta in the Netherlands and he demonstrated the programs being applied to accomplish the goals of this organization.

Participants attended a dinner which was hosted by IALA.

Day 4 – Thursday 23rd, 2019

Session 13 – Advanced IWRAP Modelling
Lecturer – Mr. Omar Frits Eriksson – Deputy Secretary-General / Dean of IALA

The fourth day of the seminar began with the participants stating the results they achieved from creating a model in IWRAP across the Hatter Barn area. Most participants achieved similar results which showed the IWRAP method being applied is stable and not very sensitive, this also reflected the participant's understanding of the method. During an interactive session with the participants, Mr. Eriksson explained that the differences in the results are based on how the legs are placed, including the capture area of the legs. Mr. Eriksson explained how participants can load their national AIS data into IWRAP. He then explained how changes can be made to the geometry of the model and the statistical computations (standard deviation, mean and weight) to simulate 'what/if' analyses. He showed how to copy data of legs and the volume of the traffic. By copying a leg, automatically a master leg is created. When later the volume of traffic in that leg is changed, only the master needs to be amended. He also explained why IWRAP is unable to calculate the number of collisions in a turning basin/ship turning scenario and that IWRAP is unsuitable for confined waterways. Mr. Eriksson then presented the historical incident rate across the Hatter Barn area. In closing, he demonstrated how to use the arrows and leg extensions to determine how well the traffic was captured along the legs.

In another lecture, Mr. Eriksson explained how causal relationships can be modelled using Bayesian networks. Mr. Eriksson then referred to a book which may be useful for assessing the human component of risk assessment: '*Guide to Practical Human Reliability Assessment'* which was written by Barry Kirwan.

Session 11 – Simulation Techniques in Risk Management
Lecturer – Professor Knud Benedict, Professor at the Maritime Dept. of Wismar University in Rostock/Germany

Mr. Benedict started this second session on maritime simulators with an overview of all different simulator types and new developments, from VTS and bridge simulation to decision support simulators. He also took a closer look at all the pro's and con's about advanced simulations systems. Mr. Benedict's presentation dealt with samples of the application of maritime simulation based on a description of

objective and tasks including human factors in risk-based ship design methodology. This was expanded to highlight specific factors to be considered in correct simulation. Exercises with desk top and fast time simulation were shared. He informed about several European projects, for example a maritime simulator network and sea traffic management project.

Session 13 (continued) – Advanced IWRAP Modelling
Lecturer – Mr. Omar Frits Eriksson – Deputy Secretary-General / Dean of IALA

Mr. Eriksson then continued to explain how to interpret results of the collisions and grounding model that were generated across the Hatter Barn area, for example, by using filters in the ship – ship results tool. He also explained how IWRAP can be used to take screenshots while building the model, different base maps and georeferenced nautical charts can be loaded in IWRAP, and he explained how results can be exported from IWRAP; to be included in the Annexes of reports. He highlighted that it is important to document assumptions made when developing the model, for example assumptions relating to the causation factors.

Filtering Traffic Density Plots
Next, participants were encouraged to develop a second model in IWRAP, using training data for Singapore. Participants were then taught how to apply filters to the density plots and use the 'replay' function in IWRAP, to acquire meaningful results. For example, filtering vessels speeds to locate anchoring areas across the waters. Mr. Eriksson also demonstrated how hotspots of collisions can be identified by applying filters for the 'closest point of approach' and 'time to closest point of approach, across the waters of Singapore. Mr. Eriksson provided an explanation of the ship domain theory which was developed by Fuji (1971) then demonstrated how ship domains can be applied when using the 'replay' function in IWRAP, he also explained how movies of the movement of ship generated by the 'reply' function can be generated.

Presenter - Mr. Siegberto Schenk from Conapra, Brazil
A presentation was delivered by Mr. Siegberto Schenk from Conapra, his presentation was entitled 'Risk Analysis of Ship Maneuvers in Ports and Waterways: Contribution of the Human Factors,' which is being developed at Brazil's Port Authority and the University of Sao Paulo. He began his presentation by explaining the motivation for conducting the risk analyses. He then went on to explain the steps taken to develop the model, simulations, field studies and the opinions of experts to analyse the risks of ship maneuvers in ports and waterways. With reference to a case study, he explained that a standard model was developed, he presented results of the study and concluded with the ongoing research and challenges.

Mr. Eriksson continued with a lecture about the detection of near misses using AIS. He explained the concept of near misses and explained that a software was developed by the Danish Maritime Authority which is named Near Miss Detection (source code available on GitHub: https://github.com/dma-ais) to detect near miss groundings and collisions. He then showed examples of groundings and collisions which were detected using the software. He explained that the Danish Maritime Authority evaluated 5 years of AIS data, and found that for every actual grounding/collision, there are 10 near miss situations. A discussion among the participants followed regarding the concept and benefits of reporting near misses.

Session 11 (continued): Using Simulation for Decision Support

Lecturer: Professor Knud Benedict, Professor at the Maritime Dept. of Wismar University in Rostock/Germany

Professor Benedict's presentation explained how simulations can be used for decision support in maritime operations. He began by referring to IALA's guidelines for simulation of waterway designs and AtoNs planning. He then discussed how simulation can support decision making using the following examples: VTS way-time graph, numerical risk model with an example across the kiel – Canal, prediction of encounters using a portable pilot unit from the Panama Canal, maneuvering predictions (using SAMMON). Professor Benedict went on to demonstrate the benefits of using simulation for decision support by presenting case studies, such as the COSINUS and MUNIN projects. Professor Benedict then briefly discussed the modelling and visualization of aids to navigation, during which he made referenced to IALA's guidelines. He explained the effects of resolution when visualizing AtoNs and showed a video presentation of simulation of AtoNs across a waterway.

Presenter: Ms. Shivani Dawn Seepersad from the University of the West Indies, Trinidad and Tobago

Ms. Seepersad gave a presentation about her PhD research, which is based on conducting an economic assessment of risks in maritime navigation across the Greater Caribbean Region. She explained why it is important to conduct this research, discussed strategies tested (IWRAP and LINZ hydrographic risk assessment strategy), approach being developed in her research and lastly the conclusions and ongoing work.

Day 5 – Friday 24th May, 2019

Session 14 – Discussion on the IALA Risk Management Toolbox

Lecturer – Mr. Omar Frits Eriksson – Deputy Secretary-General / Dean of IALA

The day began with a lecture about the development and principles of satellite AIS from Mr. Eriksson. He informed why satellite AIS data is not suitable for the IWRAP tool. He used the case of having built a satellite named Omar-1, in cooperation with a university, to show that data from a shore based AIS station is suitable but commercial AIS data can be incomplete and not suitable for an IWRAP tool. He explained

future solutions of how to deal with the challenges and how to get hold of good AIS data. He informed that one can be to use IALA-NET which is a global data exchange scheme, that is available for IALA Members.

In another presentation, Mr. Eriksson explained the Formal Safety Assessment (FSA) guidelines, highlighting that the IALA Risk Assessment Toolbox is endorsed by the FSA. He went on to explain how the Toolbox works in line with each step of the FSA guidelines.

Lecturer: Captain Roger Barker – Director of Navigational Requirements at Trinity House

Mr. Barker highlighted a dangerous situation across Sandettie, UK where two very large vessels were overtaking each other because one vessel was behind schedule. He explained that the IWRAP model will be used to highlight the need to implement RCOs across the waterway. Mr. Barker encouraged feedback from the participants on the type of RCOs which should be implemented.

Mr. Eriksson then demonstrated to the participants how to use the Traffic Area Element tool to model increased risk of collision, due to the transit of non-SOLAS vessels such as fishing vessels.

Complementary use of the IALA Risk Assessment Toolbox

During a lively discussion with the participants, Mr. Eriksson reinforced the principles, data requirements and application of each tool in the IALA Risk Assessment Toolbox. His lecture raised the question of which tool should be applied to the construction of a new port, Mr. Eriksson explained how each tool can be applied to assess the potential risk for a new port.

Mr. Eriksson then briefly explained the test case of applying SIRA in Fiji, to show the operational practice of a SIRA assessment.

Lecturer: Professor Knud Benedict

In closing, Professor Benedict ended the Seminar by singing theme songs for each tool of the IALA Toolbox.

Session 15: Closing Ceremony

Mr. Eriksson, Deputy Secretary-General / Dean of IALA presented each participant with a certificate which was issued on behalf of the IALA WWA. Each certificate stated that the participant attended a Marine Aids to Navigation Manager training seminar on the use of the IALA Risk Management Tools. The Dean

expressed his sincere thanks to all participants of the seminar and encouraged participants to maintain a close cooperation with IALA and its Academy.

3.0 Conclusion

During the training seminar, participants were presented with the concepts of risk management, information about the importance of stakeholder liaison, the value of the four IALA Risk Management Tools in relation to international guidelines, and training sessions to apply each tool to different scenarios. Participants of the seminar were interactive with the lecturers during each session and the lunch/coffee breaks; the nature of the interactions indicated that they had a good understanding of the information presented to them.

Annex A - Programme

Monday 20th May			
09:00 – 09:30		**Registration**	
09:30 – 10:30	**Session 1**	**Opening Ceremony and Introduction to IALA and the IALA WWA and international obligations under SOLAS**	**Francis Zachariae** **Omar Frits Eriksson**
11:00 – 12:00	**Session 2**	**Introduction to the IALA Risk Management Toolbox** Introduction to navigation risk IALA Risk Management Toolbox Overview	**Omar Frits Eriksson**
13:30 – 14:15	**Session 3**	**Case Study of the use of IALA Risk Management Tools**	**Roger Barker**
14:15 – 15:00	**Session 4**	**IWRAP Mk 2** Development and Principles	**Omar Frits Eriksson**
15:30 – 16:30	**Session 5**	**SIRA** Development and Principles SIRA Test Case	**Kevin Gregory**
16:30 – 17:00	**Session 6**	**Practical Applications of IWRAP Mk 2**	**Per Christian Engberg**
17:30 – 19:00		**Welcome Reception**	
Tuesday 21st May			
09:00 – 12:00	**Session 7**	**PAWSA Mk 2** Development, Principles and Use of Workbooks	**Mahesh Alimchandani**
13:30 – 16:30	**Session 8**	**Test Case PAWSA Mk 2**	**Mahesh Alimchandani**
16:30 – 17:00	**Session 9**	**Use of Simulation in Risk Management**	**Knud Benedict**
Wednesday 22nd May			
09:00 – 12:00	**Session 10**	**IWRAP Mk 2 Modelling** Creation of an IWRAP Mk 2 model using AIS data	**Omar Frits Eriksson /** **Dawn Seepersad**
13:30 – 15:00	**Session 11**	**Simulation Techniques in risk management**	**Knud Benedict**
15:30 – 17:00	**Session 12**	**SIRA - Case Study**	**Minsu Jeon**
19:30 – 21:30		**Seminar Dinner**	
Thursday 23rd May			
09:00 – 17:00	**Session 13**	**Advanced IWRAP Mk 2 modelling**	**Omar Frits Eriksson /** **Dawn Seepersad**
Friday 24th May			
09:00 – 10:30	**Session 14**	**Discussion on the IALA Risk Management Toolbox** Complementary use of IALA Risk Management Tools, discussion and conclusions	**All**
11:00 – 12:00		**Closing Ceremony** Issue of Certificates and closing remarks	

Annex B – List of Participants

Participant	Title	Member Country	E-mail	
Miss Azreena ABDUL MUIN	Spartan Maritime (M) SDN. BHD.	Malaysia	azreena@spartan-asia.com	Participant
Mr Mahesh ALIMCHANDANI	Australian Maritime Authority	Australia	Mahesh.Alimchandani@amsa.gov.au	Lecturer/participant
Mr Javier ARGUL MARIN	Puertos del Estado	Spain	fjargul@puertos.es	Participant
Captain Roger BARKER	Trinity House	UK	roger.barker@thls.org	Lecturer
Prof Knud BENEDICT	Hochschule Wismar	Germany	knud.benedict@hs-wismar.de	Lecturer
Mr Wilhelmus DE POOTER	Rijkswaterstaat Zee & Delta	Netherlands	thecaptain@scage.eu	Participant
Mr Gianfranco DI NOCERA	Italian Coast Guard	Italy	gianfranco.dinocera@mit.gov.it	Participant
Ms Marilyn EGHAN	Ghana Maritime Authority	Ghana	marilyn.eghan@ghanamaritime.org	Participant
Mr Per ENGBERG	LECTURER	Gatehouse Maritime-Denmark	pch@gatehouse.dk	Lecturer
Mr Omar Frits ERIKSSON	IALA Deputy Secretary-General /Dean, World-Wide Academy	IALA	omar.eriksson@iala-aism.org	Lecturer
Capt Sukhbir Singh GOPAL SINGH	Safety of Navigation and Maritime Communication Division	Malaysia	sukhbir@marine.gov.my	Participant
Mr Kevin GREGORY	IALA Education and Development Manager	IALA	kevin.gregory@iala-aism.org	Lecturer
Mr Jamie HOLMES	Nash Maritime Ltd	UK	j.holmes@nashmaritime.com	Participant
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Rear Admiral (Retired) Nilo Moacyr Penha RIBEIRO	SALVAGE	Brazil	niloribeiro@terra.com.br	Participant
Mr MUNIYAN SAVUNDARAPANDY	Directorate General of	India	mspandy69@gmail.com	Participant

	Lighthouses and Lighthsips			
Mr Siegberto Rodolfo SCHENK Jr	CONAPRA	Brazil	sieg.schenk@gmail.com	Participant
Ms Shivani Dawn SEEPERSAD	University of the West Indies	Trinidad & Tobago	dawn@seepersad.org	Secretary/Participant
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