REPORT ON A TRAINING SEMINAR ON THE IALA RISK MANAGEMENT TOOLBOX

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CONTENTS

This report includes details of the programme, a list of participants and final recommendations arising from the annual 5-day training seminar on the IALA Risk Management Toolbox held in South Africa 2018.

1. Background and Objective

The seventh annual IALA Risk Management Toolbox Training Seminar delivered by the IALA World-Wide Academy was held in South Africa from 26 February till 2 March 2018. It was delivered in collaboration with Transnet National Ports Authority (TNPA). The event took place at the University of Cape Town's Graduate School of Business in the Victoria and Alfred Waterfront (V&A), Cape Town, South Africa. It was attended by 27 participants from 5 countries. In addition to the host nation, these were: Madagascar, Namibia, Guatemala and the United Kingdom. A full list of participants is at Annex B.

This course is intended to provide aids to navigation managers and other interested parties with the theoretical and practical training necessary to have a satisfactory understanding of the 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.
Upon successful completion of this course, participants will have acquired sufficient knowledge and skill to use IWRAP MkII within their organisations; organise a PAWSA MkII or SIRA workshop and recognise the use to which simulation techniques can be put in risk management and effective AtoN waterway design.

2. Progress of the Seminar

On Sunday evening a welcome reception sponsored by Transnet was organized at the Two Ocean Aquarium. A spectacular show took place with a mermaid diving team. This was highly appreciated by the participants.

Day 1 – Monday 26 February 2018

The seminar was opened formally on Monday by Mr. David Gordon, Executive Manager – Lighthouse and Navigational Systems. This is the first seminar taken place on the African continent. The Dean of the IALA World-Wide Academy, Mr. Omar Frits Eriksson then took the floor and explained the purpose of the seminar.
He pointed out that not many countries use a scientific approach to conduct a Risk Assessment. Often it is a subjective assessment of former mariners based on experience of decades ago. For that reason IALA has developed the Risk Assessment toolbox that is also endorsed by IMO.

Session 2: Introduction to IALA and the IALA World-Wide Academy (IALA WWA)
Obligations under SOLAS Ch V (Gerardine Delanoye)

Mrs. Delanoye, the Programme Manager of the IALA World-Wide Academy, delivered her first presentation on IALA which covered its aim and purposes, and its important motto: "successful voyages, sustainable planet". She explained the work of IALA via the Technical Committees and its publications which is the backbone of IALA. She looked closer to the definition of Aids to Navigation. She then briefed on the function and work of the Academy, and its training activity. She also explained the advantages of the planned move to an Intergovernmental Organization Status. Mrs. Delanoye then moved to the Academy's capacity building activities.

The next presentation, delivered by Mrs. Delanoye, was on the obligations of Coastal States under the SOLAS convention (Safety of Life at Sea). She highlighted SOLAS Chapter V Regulation 13 on the establishment and operation of Aids to Navigation (AtoN) before drawing attention to IMO SN.1/Circ 296 which endorsed the IALA Risk Management Toolbox. Mrs. Delanoye covered other important regulations in SOLAS Chapter V before moving on to the importance of national legislation which should make clear who is responsible for the provision of AtoN. As an example of good practice, she pointed out the success story of Suriname.

Session 3: Introduction to the IALA Risk Management Toolbox (Omar Frits Eriksson)

Mr. Eriksson then introduced the four components in the IALA Risk Management Toolbox (the quantitative tool IWRAP Mk 2; the qualitative tool PAWSA, the simplified tool SIRA and simulation) before explaining theoretical background to each. He explained the concept of Risk with some general examples. He 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 4a: Regional Case Study of the use of IALA Risk Management Tools (Roger Barker)

Mr. Roger Barker, Director of Navigational Requirements at Trinity House, delivered a presentation on case studies in the English Channel and North Sea between the United Kingdom and Continental Europe. 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, for example, 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, not only to determine the risk presented but also to provide for 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 relationship between the different risk assessment tools and how the respective tools can be used to consider mitigation measures for specific issues.

Session 4b: IWRAP MkII Development and Principles and Practical Applications of IWRAP MkII (Omar Frits Eriksson)

Mr. Eriksson provided greater detail of the evolution, development and principles of IWRAP MkII. He explained that it was based on defined traffic "legs" each of which used a probability curve to determine the lateral traffic distribution on each leg. 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 few 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.

Session 5: SIRA Development and Principles (Gerardine Delanoye)

In the last session of the day Mrs. Delanoye explained why the Simplified IALA Risk Assessment (SIRA) was developed especially for developing and smaller nations. She informed on the history how it was developed and then moved on with the principles of SIRA. She listed the considerations to be taken in account when selecting the zones for a SIRA assessment and then moved on with explaining what are the most common unwanted scenarios. 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.

Session 5b: SIRA Test Case Fiji (Omar Frits Eriksson)

Mr. Eriksson then explained the test case of Fiji to show the operational practice of a SIRA assessment. It was interesting to see that cultural aspects where the initial reason to conduct a SIRA. He informed on the geographical situation and typical users for this area. An IWRAP animation displayed the traffic. He then pointed out the environmental and cultural risks. After identifying the scenarios Mr. Eriksson emphasized that the probability and consequence scales are not carved in stone but should be tailored to the region.

Day 2 – Tuesday 27 February 2018

Session 6a: PAWSA MKII Development and Principles (Tuncay Cehreli)

Mr. Tuncay Cehreli, Chief Coordinator for VTS training and Operations in Turkey, started with the programme of the day. He provided an overview of the qualitative risk assessment tool PAWSA MKII and its risk factors before moving on to its planning and implementation procedures. Basically, apart from assessing the current risk, PAWSA MKII also covers evaluation of the effectiveness of existing mitigation measures and additional mitigations including their effectiveness. PAWSA originally used 5 MS Excel® workbooks to generate risk mitigation measures. After implementing PAWSA in Izmit bay with 5 books, Turkey decided to reduce to 4. The book on risk factor rating scales was not used due to its minor effect that could be ignored. He advised that PAWSA MkII is a two-day workshop together with all the participants which focus on 24 risk factors in its risk model (4 risk factors under each of 6 risk categories). The waterways risk model may be tailored keeping in mind the main focus and it is not possible to delete 1 box, only the content of the box as it is an Excel spreadsheet. The ideal proportion of participants is a split of 60/40 users/stakeholders and divided into teams with 2 or 3 in each.

He showed a local example in Izmit bay PAWSA MkII chart study where they asked the participants to identify and mark the risk areas for each risk category. Then this was combined with quantified results of PAWSA MkII. Based on experience gained Mr. Cehreli informs that the outcomes depend a lot on the motivation and continuity of the participants and it is strongly recommended to use IALA Guideline 1124 on the use of PAWSA MkII and annexed implementation guide. It covers 7 chapters from introduction to PAWSA MkII to post workshop actions.. It is important to provide statistical information as input to the workshop. This can be about traffic volumes, cargoes and beside that hydro/meteo and waterway information should be available during the workshop.

Session 5b: PAWSA Use of workbooks (Tuncay Cehreli)

Mr. Cehreli started with giving the advice to only approach an organisation for participation instead of individuals. It should be the decision of the organisation who to send to a PAWSA workshop and not the choice of the facilitator. After this he gave a very clear presentation on the function and use of the 5 PAWSA MkII workbooks. He explained the inputs into the Waterways Risk model, the 6 x 4 risk matrix model, and the considerations to be taken during the input process, including the immediate and subsequent consequences of maritime accidents. The content of each box was explained and Mr. Cehreli ones again emphasised you may tailor the factors as appropriate based on the needs of your area.

Mr. Cehreli then explained that under the guidance of a facilitator (moderator) supported by dedicated note-takers, teams input scores (1 – 4) into the relevant workbook input sheets. Once processed by the PAWSA MkII software, the results convert in 1.0 – 9.0 scale on the baseline risk matrix. Book 2 then assessed the relative expertise of each team in each of the 6 risk categories resulting in an output of team expertise distribution. The combination of Book 1 and 2 outputs were used to determine the effectiveness of existing risk mitigation measures and whether they adequately balance the risk level or not.. The Book 3 output displays the list of balanced/unbalanced mitigation measures with levels of each risk factor and which require further investigation. Book 4 processes additional interventions and determines the results of such measures before displaying specific measures and cautions. He ended this session with showing the difference between the original PAWSA workbooks and the tailored versions used during the regional case.

Session 5c: Test Case – Izmit Bay, PAWSA MkII Test Case (Tuncay Cehreli)

Mr. Cehreli started this presentation by saying he could imagine that the previous presentation about the use of the workbooks may not be easy to understand . Therefore, Izmit Bay PAWSA implementation was shown as a test case to make all clearer. He showed the exact programme that was conducted during this PAWSA session. He outlined the maritime environment/domain and traffic pattern in the area before providing statistical details including marine accident figures. He explained that the 24 risk factors were some of tailored to apply to specific characteristics of Izmit Bay. Having completed the outline briefing, Mr. Cehreli invited participants to complete sections of PAWSA Book 1. He informed that participant even if they are not expert in the topic should answer them all, as the knowledge, thoughts and perception of all participants is important. The results can be compared with statistics.

Session5c: PAWSA MkII Test Case – continued (Tuncay Cehreli)

Mr. Cehreli then started with workbook 2 Risk Factor Rating Scales and continued with workbook 3 on team expertise. This team expertise input to the PAWSA software affects the outcomes as it is a weight factor that is applied. He continued with book 4 on existing mitigation measures effectiveness and finished with book 5 on additional mitigation measures and their effectiveness.

He ended with a summary stating that the combination of Book 1, 2, 3 and 4 outputs were used to determine the effectiveness of existing risk mitigation measures which teams agree are balanced or whether additional measures are required. The Book 4 output displays the list of balanced and unbalanced existing mitigation measures and which require further investigation. Book 5 processes additional interventions and determines the results of such measures before displaying specific measures and cautions.

Mr. Cehreli ended the whole PAWSA MkII session by sharing the recommended solutions at Izmit bay. One of the most important additional measures proposed by the PAWSA workshop participants was the implementation of a VTS.

Session 7: Use of Simulation in Risk Management (Knud Benedict)

Mr. Knud Benedict, Professor at Maritime Dept. of Wismar University in Rostock/Germany, continued with a presentation on the Use of Simulation in Risk Management, definitions and samples. He started with some initial 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 given: The general elements of using simulation were shown for the sample EU Project FAROS on "Human Factors in Risk-Based Ship Design Methodology". Finally, specific samples for Waterway and Accident Investigations and samples for Risk Management in Ship Operation were explained in detail.
He ended by promising to provide an overview of how simulation was used as a key component of the IALA risk management toolbox and its interaction with IWRAP MkII and PAWSA MkII.

Day 3 – Wednesday 28 February

Session 8: Creation of an IWRAP MkII model using AIS data (Omar Frits Eriksson)

Assisted by Mr. Per Christian Engberg the Chief Architect at Gatehouse Logistics, Mr. Eriksson guided participants through the process of creating an IWRAP MkII model based. AIS data and chart data from Malacca Strait, Singapore and Denmark were then handed out. Al participants then started with the first exercise on collision and a second exercise on groundings. They explained how to copy data of legs and the volume of the traffic. By copying a leg, automatically a master leg is created. When later on the volume of traffic in that leg is changed, only the master needs to be amended. The participants had plenty of time to exercise with the tool and some of the results were discussed.

Session 9: Overview of Maritime Simulators, Simulation Techniques in risk management (Knud Benedict)

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 accurate 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 10: Case Study Port of Cape Town, Simulation (John Burns)

After lunch Mr. John Burns a consultant of Consulting Port and Coastal Engineers gave a presentation on the relocation of the front and rear leading lights in Duncan Dock. The presentation showed the situation of a new hospital building impacting the visibility of the leading line. They used a ship simulation to reposition the leading lights. The ship manoeuvring simulation studies are carried out by PRDW using SimFlex4, a simulation software application developed by Force Technology. A simulator exercise was shared with the participants. This presentation was followed by a bus tour to the Port of Cape Town where the leading lights could be seen in real.

Day 3 – Thursday 1 March 2018

Session 11: Advanced IWRAP MkII modelling (Omar Frits Eriksson & Per Engberg)

Mr. Eriksson started this session with explaining in detail a case study of Hatter Barn. He then described the elements of an IWRAP-Analysis report, and moved on with instructing how to make a project in IWRAP and how to add a new project. It was interesting to see the result of applying a filter on a density plot in Singapore Strait. Applying a speed filter revealed many vessels at anchor. He ended this session with explaining the principle of Closest Point of Approach, and demonstrated how it was possible to illustrate hotspots in a waterway in a video clip, created with IWRAP, while applying CPA/TCPA filtering.

He started with looking in deeper detail to the Hatter Barn Case and how he identified the hotspots in several ways. He showed the case that has a traffic separation scheme with a deep-water route and explained how to copy traffic from one part of the leg to another part. The results of running an IWRAP exercise showed that the grounding frequency was noticeably higher than the historical data.
Mr. Eriksson then informed why satellite AIS data is not suitable for the IWRAP tool. He used the case of having built a satellite, Omar-1, in cooperation with a university. It clearly showed that data from a shore based AIS station is suitable but commercial AIS data can be incomplete and not suitable for an IWRAP tool. If you consider to use commercial satellite data it would be important to ask the maximum interval of hits for all ships. He explained future solutions how to deal with the challenge on how to get hold on good AIS data. He informed that one

can be to use of IALA-NET. It is a global data exchange scheme that is available for IALA Members. He then explained the reporting of an IWRAP by the example of a Danish report that was in input paper to IMO.

3. Final session, conclusions and closing ceremony

Day 5 – Friday 2 March 2018

Session 14: Complementary use of IALA Risk Management Tools, discussion and conclusions

Mr. Eriksson opened the first session with a presentation on estimating causation factors using Bayesian networks. He then moved on with explaining the relation between the IALA Risk Assessment Toolbox and the IMO Formal Safety Assessment methodology (FSA).
Mr. Cehreli then continued this session emphasizing that the question what tool is the best is not relevant. You should consider the region, hazards and needs that are typical for your area. He used the example of the suspension of the bridge in Izmit bay to explain this in greater detail. He explained that PAWSA was not sufficient to verify the risk control options. In several scenario's it was tested what was the best way for ships to approach a bridge that was in a bend. The results showed that it was the best when ships did not have to alter course near to the bridge but the ship was in a straight line to that bridge before making its approach. He also introduced the Izmit bay IWRAP study which has been done by Istanbul Technical University Maritime Faculty to emphasize the importance and benefit of complementary use of the IALA toolbox. An example was given on a situation in Izmit bay.

A lively discussion was the start of this session and it showed that often more than one risk control option is needed to bring down the risk. Mr. Benedict underlined the benefits of use of simulation particularly on identifying the risks and evaluation of the effectiveness of the new planned mitigation measures. The benefit of simulation is that you can estimate future results, for example on ships behavior. Then Mr. Eriksson focused on mutual positive effects of the tools when used sequentially or in parallel.
Mrs. Delanoye explained that a general observation from the IALA WWA technical missions is that many developing countries are considering to install VTS. Often this is not based on an assessment of the volume of traffic and degree of risk, as required in SOLAS Ch. 5 Safety of Navigation reg. 12. In some countries, the outcome of a risk assessment could be that improving the AtoN provision together with surveys, charting, issuing Maritime Safety Information and pilotage is sufficient to mitigate the risks and that VTS may not be needed.
Roger Barker added that the overall tools give the opportunity to assess in the first place if a previously unidentified risk exists and then to assess possible mitigation measures. He added that there will be some bodies who are only looking for a "tick box" answer which may not be the ideal solution, and the overall combination of a quantitative and qualitative risk assessment can help to avoid this. Finally, he once again emphasized how the IALA risk Tool box not only provides for risk identification and mitigation but also allows for a comprehensive record of decisions taken which can be extremely useful in subsequent queries and reporting.

Session 15: Closing ceremony

Mr. Naresh Sewnath, chief harbor master of Transnet and the Dean of the Academy gave all participants a certificate. The Dean expressed his sincere thanks to Transnet for organizing and hosting the seminar. The generous sponsorship from Transnet was not only for the benefit of IALA but also for the participating countries. Transnet is a center of excellence in the region and has expressed its firm intention to continue its close cooperation with IALA and its Academy.

Gerardine DELANOYE
Programme Manager IALA World-Wide Academy

2. Program

Time	Event	Content	Chair/Presenter	Place
Day 0- Sunday 25 February				
All day	Participants Arrival	Check in		Hotel

18:00 – 20:00	Welcome Reception	Sponsored by TNPA	David Gordon, Executive Manager – Lighthouse and Navigational Systems	Two Oceans Aquarium
Day 1-Monday 26 February				
08:30 – 09:00	Registration			UCT GSB*
09:00 – 09:30	Session 1	**Opening Ceremony**		UCT GSB
		Opening Speech	David Gordon	
		Opening Speech	Omar Frits Eriksson, Dean of the IALA World-Wide Academy	
09:30 – 10:30	Session 2	**Introduction to IALA and the IALA WWA and international obligations under SOLAS**	Gerardine Delanoye, Programme Manager IALA WWA	
10:30 – 11:00	Break	Group photograph & Coffee break	All participants	
11:00 – 12:00	Session 3	**Introduction to the IALA Risk Management Toolbox** Introduction to navigation risk IALA Risk Management Toolbox Overview	Omar Frits Eriksson	
12:00 – 13:30	Lunch			Protea Hotel
13:30 – 14:15	Session 4a	**Reginal Case Study of the use of IALA Risk Management Tools**	Roger Barker	UCT GSB
14:15 – 15:15	Session 4b	**IWRAP MkII** Development and Principles	Omar Frits Eriksson	
15:15 – 16:00	Session 4b	Practical Applications of IWRAP MkII	Omar Frits Eriksson	
16:00 – 16:30	Coffee break			
16:30 – 18:00	Session 5 Session 5b	**SIRA** Development and Principles SIRA Test Case	Gerardine Delanoye Omar Frits Eriksson	
Day 2 –Tuesday 27 February				
09:00 – 10:30	Session 6a	**PAWSA MkII** Development and Principles	Tuncay Cehreli	UCT GSB
10:30 – 11:00	Coffee break			
11:00 – 12:00	Session 6b	PAWSA MkII - Use of workbooks	Tuncay Cehreli	
12:00 – 13:30	Lunch			Protea Hotel
13:30 – 14:30	Session 6c	Test Case PAWSA MkII – Izmit Bay	Tuncay Cehreli	UCT GSB
14:30 – 16:00	Session 6c	Test Case PAWSA MKII – Izmit Bay - continued	Tuncay Cehreli	
16:00 – 16:30	Coffee break			
16:30 – 18:00	Session 7	**Use of Simulation in Risk Management**	Knud Benedict	
Day 3 –Wednesday 28 February				
09:00 – 10:30	Session 8	**IWRAP MkIIModelling** Creation of an IWRAP MkIImodel using AIS data	Omar Frits Eriksson & Per Engberg	UCT GSB
10:30 – 11:00	Coffee break			

11:00 – 12:00	Session 9	**Overview of Maritime Simulators** Simulation Techniques in risk management	Knud Benedict	
12:00 – 13:30	Lunch			Protea Hotel
13:30 – 18:00	Session 10	**Case Study Port of Cape Town, Simulation**	David Gordon	TBC

18:00 – 20:00		Dinner		
Day 4–Thursday 1 March				
09:00 – 10:30	Session 11	**Advanced IWRAP MkIImodelling (1)**	Omar Frits Eriksson & Per Engberg	UCT GSB
10:30 – 11:00	Coffee break			
11:00 – 12:00	Session 11	Advanced IWRAP MkIImodelling (2)	Omar Frits Eriksson & Per Engberg	
12:00 – 13:30	Lunch			Protea Hotel
13:30 – 15:30	Session 11	Final IWRAP MkIImodelling	Omar Frits Eriksson & Per Engberg	UCT GSB
15:30 – 16:30	Session 12	**Complementary use of IALA Risk Management Tools** Regional Case Study-Izmit Bay (Merged with session 14!)	Tuncay Cehreli Omar Frits Eriksson	
16:00 – 16:30	Coffee break			
16:30 – 18:00	Session 13	**Comparison between models** IWRAP Case Study Malacca Strait (Merged with session 11!)	Omar Frits Eriksson	
Day5–Friday 2 March				
09:00 – 10:30	Session 14	**Discussion on the IALA Risk Management Toolbox** Complementary use of IALA Risk Management Tools, discussion and conclusions	Omar Frits Eriksson Tuncay Cehreli Roger Barker Knud Benedict Gerardine Delanoye	UCT GSB
10:30 – 11:00	Coffee break			
11:00 – 12:30	Session 15	**Closing Ceremony** Issue of Certificates and closing remarks	Omar Frits Eriksson, Dean of the IALA World-Wide Academy & David Gordon, Executive Manager – Lighthouse and Navigational Systems	
12:30 – 14:00	Lunch	Participants disperse on completion		Protea Hotel

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