



IALA TRAINING SEMINAR

on

IWRAP Mk II

20-24 April 2009

Kuala Lumpur, Malaysia

Final Report

Executive Summary

The seminar was held at the Berjaya Times Square Hotel and Convention Centre and was attended by thirty six delegates from sixteen countries.

The seminar began with a series of presentations before the delegates began to gain 'hands on experience' with the revised IWRAP Mk II program. Further presentations were made as the seminar developed, introducing additional topics and addressing some aspects of the theory of IWRAP Mk II in greater depth.

Subsequently, delegates developed their own model of the Malacca Strait before visiting the Malacca Strait VTS centre, where the experience of the operators was drawn on to explain issues arising from individual modelling work and group discussions.

Delegates were also given the opportunity to explore a more detailed and complete pre-processed model of the Malacca Strait derived by DAMSA directly from 12 weeks of AIS data, kindly provided by the Marine Department Peninsular Malaysia. When run, this model yielded a collision frequency strikingly similar to that derived from historical data. Also one developed a model for Lepsoy, Norway. When compared with a recent DNV Risk Assessment, the results from using IWRAP Mk II provided good correlation.

The seminar provided an excellent opportunity for delegates to discuss the theory and practice of using the IWRAP Mk II program, drawing on the expertise of the instructors and local knowledge, and develop their own skills.

The workshop identified 10 conclusions and 7 recommendations (see Annex 5).

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1 INTRODUCTION

The IALA Training Seminar on IWRAP Mk II was held from 20-24 April 2009 in Kuala Lumpur, Malaysia, at the Berjaya Times Square Hotel and Convention Centre. It was attended by thirty six delegates from sixteen countries.

The objective of the seminar was to introduce the revised IWRAP Mk II tool and instruct delegates on its use, as well as familiarise them with the program's strengths and weaknesses. Considerable emphasis was placed on case studies, with practical issues associated with the main study being discussed with operators at the Malacca Strait Vessel Traffic Services (VTS) centre.

Day One – Opening of the Workshop and Introduction

2 OPENING OF THE SEMINAR

The opening was chaired by Ómar Frits Eriksson, Danish Maritime Safety Administration (DaMSA), Denmark.

2.1 Opening remarks

Ómar Frits Eriksson welcomed everyone to the seminar, which would introduce the delegates to the revised IWRAP Mk II tool. He anticipated a week of excited discussion on the culmination of what had been more than two years of hard work. He said that there were experts on hand to explain how the model works and to assist with its operation as the week unfolded. He expected that, by the end of the week, the delegates would be able to decide for themselves how useful the tool is and looked forward to them acting as ambassadors for it on their return home.

2.2 Welcome by Marine Department Peninsular Malaysia

Captain Ahmad bin Othman, Director-General of the Marine Department Peninsular Malaysia gave the following address.

Mr Torsten Kruise, Secretary-General of IALA, distinguished participants, ladies and gentlemen. I wish you a very good afternoon and welcome to Kuala Lumpur, Malaysia.

First and foremost, I would like to extend a warm welcome and my sincere appreciation to the Secretary-General of IALA for choosing Malaysia to host this very important training seminar. As we all know, risk assessment is now a necessity for any new port or waterway development project. I sincerely hope we can learn from this seminar and implement this tool to enhance the safety of navigation in our own waterways.

Apart from training sessions that will be conducted in this room, Malaysia will host a dinner tomorrow night and we have arranged for a visit to Marine department VTS and AIS Centre in Port Klang on Thursday 23 April. You will be able to see where data used in some of the training sessions during this seminar is collected.

Before I conclude, allow me to extend my sincere appreciation and gratitude to our sponsors, Big City Forwarders for the seminar bags and Dickson Marine for the memory sticks. A special thank you to the secretariat, namely Dr Mike Hadley, Mr Abdul Nasar and his team for their hard work in making this event possible.

I hope that we have provided you with a good venue for this seminar and lastly I wish all of you a pleasant, enjoyable and memorable stay in vibrant Kuala Lumpur.

2.3 Welcome by IALA

Torsten Kruise, Secretary-General of IALA, thanked the Marine Department Peninsular Malaysia for their support in planning and preparing for the seminar, saying that previous experience showed that Malaysia could be relied on to rise to a short notice challenge. He observed that the group of delegates, although small, contained the right people

Noting that IALA had been working with Risk Management for some time, he remarked on the initial disappointment of having to withdraw IWRAP Mk I, after its initial introduction. He went on to thank Omar Frits Eriksson, who had volunteered to lead the work of developing IWRAP Mk II, and the enthusiastic and hardworking Steering committee in the successful production of the revised tool. This, of course, was why the seminar was being held.

However, although now providing a sound basis for risk assessment, IWRAP Mk II is only the start of a process that will see the further addition of capability, over time.

Torsten Kruise ended by advising the delegates that the week would prove a progressive experience, as their skills were developed. Despite the hard work that lay ahead, he wished everyone a successful and enjoyable week.

2.4 Health and Safety and Administration Brief

Mike Hadley, Technical Co-ordination Manager, IALA, provided information on health and safety matters and made various administrative announcements. He advised that a USB memory stick, containing all the seminar material, including presentations, would be provided to delegates on Friday 25 April.

3 SESSION 1 - INTRODUCTION TO THE IALA RISK MANAGEMENT TOOLBOX

This session was chaired by Ómar Frits Eriksson, (DaMSA).

3.1 Presentation of the IALA Risk Management Toolbox (Torsten Kruise, Sec. Gen. of IALA)

In answer to the question 'why IWRAP', he said that it arose from the SOLAS chapter V requirement for authorities to provide AtoN in accordance with the traffic and risk, with risk being poorly accounted for. Historically, the risk assessment was based on gathered data and the nautical chart. However, with the advent of AIS there was now the possibility to gather better information, for instance being able to see that vessels do not always follow the expected routes and the short-cuts that were being taken.

Given this, IALA had, therefore, decided to produce a risk management tool able to meet the SOLAS demand. The tool would be free to IALA members, with a request to report back on its use. It consists of two components: PAWSA, which is qualitative and IWRAP Mk II, which is quantitative. The Secretary-General went on to say that there would be an introduction to PAWSA, by Dr March Thibault (USCG), but the seminar will focus on IWRAP Mk II. The beauty of PAWSA is that, via its process, one gains stakeholder 'buy in' and identification of hotspots. IWRAP Mk II, on the other hand, provides a mathematical analysis, determining the probability of collisions and groundings. Nonetheless, it is emphasised that there benefits in using both components of the IALA Risk Assessment toolbox, which can be used separately, sequentially or in parallel.

This led to a short discussion of what constitutes acceptable risk, which actually depends on the view point of the person consulted and possible recent events, locally.

Once IWRAP has been used in several places, it should be possible to compare the results and establish an agreed acceptable risk level for a given waterway.

3.2 An introduction to PAWSA (Dr. Marc Thibault, USCG)

The presentation covered the methodology underlying the process employed in the Port and Waterway Safety Assessment model (PAWSA). Applying the process normally takes two days and relies heavily on the input of up to thirty local 'expert' stakeholders. Here, due to the potential for disagreement, the choice of the PAWSA facilitator is crucial. The risk categories and factors were described before some sample results, including numerous AtoN improvements and the establishing of two new VTS centres. The presentation ended with some comments about the relationship between PAWSA and IWRAP Mk II. Dr Thibault offered to provide further information on PAWSA, specifically the risk scales.

During questions, it was confirmed that there is already a move towards automating the PAWSA process, with the aim of providing instantaneous feedback to stakeholders' inputs. Trials planned for later in 2009, during assessments in Honolulu and Houston. It was also agreed that having information from before and after any changes to a waterway can only be helpful in assessing the validity of the process. In this respect it was noted that some ports in the USA are now undergoing a second assessment. Finally, it was noted that the involvement of stakeholders can lead to disagreement, which is where the skill of the facilitator comes into play and the advantage of providing a 'read ahead' package, so that stakeholders arrive well briefed. However, it was noted that no one person can be an expert in all relevant areas and that the weighting of opinions needs to be considered. However, it was agreed that the aim has to be to obtain 'buy in' from all involved.

3.3 A Short introduction to IWRAP (Ómar Frits Eriksson, DaMSA)

The introduction began with the background to the development of the IALA Waterway Risk Assessment Program (IWRAP), which could be traced back to at least 1974, with significant steps forward being made in the mid to late 90s, leading to the introduction of IWRAP Mk I in 2006. The design rules and probabilistic approach taken were described, which illustrated the considerable input by PIANC. Brief mention was made of the selection of AtoN, the derivation of the effects of wind and current, the basis for the assessment of minimum safe channel width and the desirability of the channel width ratio being greater than 1.0. The development of probabilistic models was then described. At a verification workshop in Copenhagen the Steering Group realized that the results obtained with IWRAP Mk I were too pessimistic. The Steering Group then decided to start from scratch with the probabilistic modelling part. This had resulted in IWRAP Mk II which has now been evaluated by the Steering Group, and found to be working well. Ómar Frits Eriksson stressed that IWRAP Mk II only addresses the probabilistic part of the "Risk = Probability x Consequences" equation, and that proper training of analysts is essential for the successful application of IWRAP Mk II.

3.4 Case studies for validation of IWRAP Mk II (Markus Porthin, VTT)

The presentation began with a description of the validation methodology before the various test cases in Fredrikstad, the Great Belt, the western Baltic and the Sea of Aland, together with their results, were covered.

The overall conclusions were that:

- IWRAP calculates incident rates to be well within an order of magnitude of the historical evidence available;
 - ✓ In most cases the calculated value is within a factor of 2.
- IWRAP has been found to be a sound tool for estimating expected collision and grounding frequencies;
- However, the analyst must be aware of the underlying assumptions and assess their validity in the case at hand.

Ómar Frits Eriksson commented that, since the validation just reported, the case study for the Drogden channel had been remodelled, leading to improved results.

On the conclusion of the session a group photograph was taken.

4 SESSION 2 – INSTALLATION OF IWRAP MK II

The session was chaired by Ómar Frits Eriksson, DaMSA.

4.1 Programme Installation & Licensing scheme

Per Christian Engberg (Gatehouse), using aspects of Michael Skov's presentation, ran through the installation process, the creation of a new project and then defining the model to be used. This included the creation of legs, the traffic distribution, the entry of ship data and causation factors. Delegates were able to undertake these tasks, simultaneously, on their own laptops, using programs provided on a USB memory stick.

With regard to licensing, Ómar Frits Eriksson said that it was intended that, following the formal release of the new software, which was expected to be shortly after the completion of the seminar, it would be freely available to IALA on a one year license. This would be renewable but the submissions of the results of using the software would be taken into account when considering renewals.

In response to a question about liability, it was explained that the software is only an aid to decision making and that because so much depends upon the accuracy and verifiability of the data input and the analytical skill of the user in interpreting the results that IALA could not be responsible for the outcome of using the software.

4.2 The IWRAP Mk II Software

Michael Skov (DamSA) illustrated the basic principles of the software and the initial entry of data, illustrating the ease of entry and highlighting the ability of the tool to now work with a variety of charting media. This topic was elaborated on by Per Christian Engberg, including the ability to now handle scanned raster charts and mapping from sources such as Google Earth, providing that there is an internet connection.

4.3 Running your first IWRAP Test Case

All delegates were then guided through an initial, low complexity test case.

Ómar Frits Eriksson ended the session with a demonstration of the introduction of internet based charting and highlighting the IALA IWRAP Wiki website (<http://www.ialathree.org/iwrap>).

END OF DAY

Day Two – Theory, Test cases and Case Studies

5 SESSIONS 3 TO 5– RUNNING IWRAP MK II

The sessions were moderated jointly by Ómar Frits Eriksson (DaMSA) and Professor Knud Benedict (University of Wismar). The day was broken down into:

- 1 The theoretical foundation behind IWRAP Mk II (Part 1) (Professor Knud Benedict (University of Wismar);
- 2 IWRAP Test Case A - One leg one ground polygon;
- 3 The theoretical foundation behind IWRAP Mk II (Part 2);

- 4 IWRAP Test Case B - Two legs with bend two polygons;
- 5 The theoretical foundation behind IWRAP Mk II (Part 3);
- 6 IWRAP Test Case C - Four legs with one bend one crossing and three area/polygons.

The scope of the instruction for the day, with three gradually increasing complex test cases, was explained. Interspersed with the practical work, the theory underlying the IWRAP Mk II model was explained, by means of a series of short presentations by Professor Knud Benedict.

In turn, Ómar Frits Eriksson ran through the construction of the various components involved in the test cases. The delegates were able to follow the steps taken on their own laptops. As anticipated, this quickly led to interactivity with the moderators and mutual support from other delegates at the same table and the available experts.

6 SESSION 6 – REAL CASE STUDY

6.1 Gathering casualty data (Markus Lundkvist, SMA) and Practical Case Study Example (Frederikstad)

This session was carried out as a joint presentation, based on a case study at Frederikstad. This began with an introduction by Ronny Vågsholm of the geography of the area, the prevailing conditions, the current AtoN arrangements and an indication of future improvements. This clearly posed a challenge for introducing the context into IWRAP Mk II, which is now much eased by the ability to use chart information.

Markus Lundkvist then discussed the application of IWRAP Mk II to the local situation, initially focussing on verification of the data and the consequences for the performance of the model. He then covered assumptions that can be inherent in the sole use of AIS data and those associated with the input of data into IWRAP. Verification of results depends on the verifiability of the data against which the results are being compared.

There then followed a discussion on causation factors and their effects on the outcome of running the model, together with the effects of AtoN and risk control measures. It was also noted that AtoNs effect **causation factor** and/or the **traffic distribution** and thereby the probability/risk.

The presentation concluded with examples from the GRISK evaluation held in the Western Baltic and the verification of the data use. At the end of the presentation, the concluding message was:

IWRAP Mk II is a flexible tool with potential
use it and provide feedback!
....and use it wisely!

END OF DAY

Day Three – More Complex Cases

7 SESSION 7 – MORE COMPLEX CASES 1

The session was moderated jointly by Ómar Frits Eriksson (DaMSA) and Professor Knud Benedict (University of Wismar). It began with a review of the work of the previous day. The day was then broken down into:

- 1 Malacca Strait Exercise;
- 2 The theoretical foundation behind WRAP Mk II (Part 4) Causation factors;
- 3 Practical exercise on Causation factors and traffic changes - Case study (Hatter Barn);
- 4 Retrieving information from AIS data with example of AIS derived data (Malacca);

- 5 Further aspects of the IWRAP software Google Earth Polygon Generation. Uploading results to the IALA FRP server (Per Christian Engberg (Gatehouse));
- 6 Questions and Answers.

The Malacca Strait exercise was an opportunity for the delegates to establish a route, based on charted data and extend their knowledge of the use of the various components of the IWRAP Mk II tool. It naturally generated much discussion and need for advice from the experts, who were circulating amongst the delegates.

The sequence of events followed during the Malacca Strait exercise was to:

- Define coastline with polygons with depth = 0;
- Define route legs;
- Define lateral distributions on legs;
- Enter traffic volume into legs;
- Define relevant grounding [polygons];
- Run model;
- Assess results – modify model etc.

The development of the model for the Malacca Strait became so engrossing for the delegates that, together with the discussion generated, it took the whole day and the remaining topics were deferred until after the visit to the Malacca Strait VTS centre.

END OF DAY

Day Four – Technical Tour and Individual Exercises

8 SESSIONS 11 & 12 – TECHNICAL TOUR

During the morning of Thursday 22 April the delegates visited the Malacca Strait VTS centre. This was hosted by Captain Ahmad bin Othman (Director-General of the Marine Department Peninsular Malaysia) and Mr Muhammad Razif Ahmad (Director Aids to Navigation). On arrival the delegates split into three groups, each in turn visiting the VTS operations room, a presentation on the Malaysian AIS network, with specific emphasis on the Malacca Strait, and the adjacent buoy tender berth, where two tenders and various buoys were available for viewing. The visit permitted delegates to seek answers to questions arising from the development of their model of the Malacca Strait the previous day.

9 SESSIONS 13 & 14 – REVIEW OF MALACCA STRAIT EXERCISE & CAUSATION FACTORS

In the afternoon, there was a brief review of the visit before Professor Benedict gave a presentation on causation factors, leading to discussion of this important subject. The day was rounded off by Markus Porthin presenting the topic of modelling the effects of risk control options, using an example case from the Sea of Åland.

By the end of the day, each delegate had modelled the Malacca Strait with varying results, in some cases due to modelling errors and, naturally, inexperience, from which valuable lessons were learned. However, the results led to the initiation of a modelling validation check being incorporated in the program. Following this, a pre-processed model of the Malacca Strait, based on 12 weeks of AIS data kindly provided by the Marine Department Peninsular Malaysia, was provided to the delegates. When run, this model yielded a collision frequency strikingly similar to that derived from historical data. IWRAP Mk II predicted 1.89 collisions while historical data showed 1.90 collisions pr. year. However, the grounding frequency was

noticeably higher than the historical data. On investigation, it emerged that the reason for this a wreck in the traffic separation scheme which, when mitigation factors were introduced, reduced the predicted grounding results, bringing them much closer to the historical data. IWRAP predicted 1.5 groundings pr. year while the historical data showed 0.4 groundings per year. It was also noted that the historical data only covered the traffic separation scheme, whereas the model covered the whole of the Malacca Strait, which would help account for the remaining variation between predicted and historical results. It was also surmised that not all groundings are reported by the vessels involved and that not all groundings occurring in Indonesian waters are known.

It was noted that one delegate had also developed a model for Lepsoy, Norway. When compared with a recent DNV Risk Assessment, the results from using IWRAP Mk II provided good correlation.

The suitability of IWRAP MK II for use in very narrow waterways was discussed and it was concluded that further investigation is required into how narrow a waterway the tool can handle. It was noted, for instance, that bank suction is not catered for in the calculations.

END OF DAY

Day Five – Further discussion and closing of the seminar

10 SESSION 15 – FURTHER DISCUSSION

This session was chaired by Ómar Frits Eriksson, DaMSA.

10.1 Wrapping up

Ómar Frits Eriksson began by covering issues that had been deferred during the development of the Malacca Strait model. He began by addressing the issue of automatically incorporating AIS data into the IWRAP Mk II program, a function that is not yet provided. An initial semi-automatic procedure was demonstrated. This was followed by the use of Google Earth to generate polygons, including their use to represent depth contours, and the process for uploading IWRAP results to the IALA FTP server. The need to provide amplifying information, in the form of a Risk Analysis Report was stressed, as a model on its own is not very informative. Key points for the report are:

- 1 Waterway description and history;
- 2 Traffic Volume and composition;
- 3 Historical evidence—details of incidents;
- 4 Route layout –IWRAP model description;
- 5 Deviation from IALA Defaults;
- 6 Establish Baseline (situation now);
- 7 Mitigating Options;
- 8 Discussion/Conclusions.

In this respect, comparing the results of running the model with verifiable historical data was emphasised. It was suggested that a template be created for the proposed covering report and it was agreed that one would be created and placed on the IWRAP Wiki. Delegates were asked to provide their suggestions to Ómar Frits Eriksson.

Based on experience gained during the seminar, Marcus Lundkvist provided some additional thoughts on:

- Calibration;

- Chart accuracy;
- Polygon making using the largest scale chart;
- Depth interpolation;
- Traffic distribution.

The point was made that a balance needs to be made between the effort put into creating a model and the improvement in the accuracy that the work provides and there was then a discussion about the pros and cons of breaking a long straight leg into smaller segments and it as suggested that where there may be an alteration of course, for instance in the vicinity of an AtoN, starting a new segment would be appropriate. In this respect AIS data could prove useful.

10.2 The Way Forward

10.2.1 Gatehouse

Per Engberg (Gatehouse) made a short presentation on his views about IWRAP MkII should develop, covering both the free and commercial versions. Several potential improvements were noted. These included:

- 1 Import historical events, display as overlay, display on main results, maybe use to calculate causation factors;
- 2 PRIMAR (ENC) WMS support;
- 3 Ease polygon digitalization, polygon edit like Google Earth;
- 4 Polygon color definition by depth;
- 5 Ranked list of collisions and groundings results, enable jump to leg, ground, waypoint;
- 6 Result view, control which results are shown;
- 7 Waypoint editor should be disabled in result view;
- 8 Indicate angle between legs, on waypoint editor;
- 9 Indicate leg length, bearing;
- 10 Check polygon for segment crossing, give warning;
- 11 Warning about leg intersection;
- 12 Split leg, i.e. add waypoint;
- 13 Combine legs, i.e. remove waypoint (will also remove a leg, ask the user which leg should be removed) what if there are more than two legs;
- 14 Remove complete polygon;
- 15 Waypoint distribution, show the remaining factor;
- 16 Traffic editor, update sum when paste into table;
- 17 Store areas in separate file, to enable sharing polygons and enable fast/background storage;
- 18 Check consistency before run, e.g. polygon consistency;
- 19 Model overview report, e.g. list causation factor changes;
- 20 How to compensate for "ferry traffic";
- 21 Check input of raster map geographical bounds;
- 22 Put in pictures of the area at locations (an arrow on the map, indicating direction the picture was taken);

- 23 Per ship type distribution;
- 24 Possibility to set, default map for a model;
- 25 Display scale on map;
- 26 Indicate traffic volume on map, e.g. with an arrow with varying color/thickness;
- 27 Scripting / plugin.

Delegates were advised to review the list and advise Per Engberg of any additional thoughts, at which a request to include provision for taking air gap into account was made. Per Engberg then advised the delegates that a revised version (version 2.1.0) had been provided for inclusion in the seminar USB stick, which included the following improvements:

- 1 If causation reduction factor is modified color green;
- 2 Handle ongoing table input when pressing ok (e.g. when modifying distribution in leg editor).

This was reported to complete the free version of the program.

An envisaged commercial program, for which a pricing mechanism needs to be agreed, would include:

- AIS Import;
- Extracting ground polygons from ENC, e.g. S-57;
- Consequence Analysis;
- Pollution/Emission report.

Asked about timing, Per Engberg said that it would depend on the financing, as this would affect the number of people working on the development. However, an estimate was 2 - 3 months.

Omar said that the pricing structure needed to be discussed by the Steering Group before more could be said about cost, other than that he wanted it to be comparable to other high grade software, otherwise there would be no takers.

10.2.2 Steering Group

Ómar Frits Eriksson made a short presentation on the future composition and work of the Steering Group, emphasising that he wanted IWRAP and its methodology to be widely accepted.

He then reminded the delegates of the vision for the IALA Risk Assessment Toolbox, and in particular for IWRAP:

To provide state of the art risk assessment tools to IALA members for providing Aids to Navigation services in accordance with the Volume of traffic and degree of risk.

To build a library of IWRAP models enabling global benchmarking of waterways.

It was suggested that a forum would be useful, in addition to the Wiki. This was considered a good idea, although the discussion page associated with any posting on the Wiki, could also serve a useful purpose.

10.3 Conclusions and Recommendations

Draft conclusions and recommendations were reviewed and then agreed by the seminar delegates (see Annex 5).

11 SESSION 16 – CLOSING OF THE SEMINAR

This session was chaired by Ómar Frits Eriksson, DaMSA, who said that it was not his intention to run through the draft report. The draft report would be posted on the IALA FTP server by 28

April and would be available for comment for fourteen days; until 12 May. The finalised report would be forwarded to the Council meeting to be held on 25 May 2009.

He then thanked all everyone, delegates and staff, for ensuring that the seminar was a success.

At the session end a USB memory stick, containing electronic copies of all input programs, data and presentations up to the Thursday (23 April), was provided to each delegate. Photographs taken on the first day were provided on a CD, together with a hard copy of the group photograph. Mike Hadley said that the presentations made on the Friday morning would be e-mailed to all delegates.

11.1 Remarks by IALA

Torsten Kruise said that it was amazing that a week had passed so quickly and that he considered that the seminar had exceeded expectations. This, he said, was in small part due to the efforts of Ómar Frits Eriksson, Professor Knud Benedict and, of course, the delegates, who he hoped had learned a lot, as IALA certainly had. He then thanked the delegates for all the constructive comments that had been made during the week and ended by saying that the tool needed to be used, so that the delegates would remember how to use it. He then handed over to Professor Knud Benedict for his summation of events, who chose to do this by serenading the meetings with two songs; one a plagiarised popular song from John Lennons "Girl" which was now turned into a "Simulator Girl" representing Marine Simulators and now also maritime software as IWRAP, dedicated to the seminar's resident programmer, Per Engberg, who he thought had aged a year during the week; the second was an improvised (IW)rap song, which is reproduced at Annex 6 as a description of the processes to handle the IWRAP program.

This resulted in a warm round of applause and the thanks of Torsten Kruise, who said that the performance had been an accurate and unforgettable summing up, on this basis of which he was looking forward to the VTS training seminar in Warnemünde in September. He then made a presentation to Professor Benedict of a pen set, so that he could write more songs. This was followed by presentations to Ómar Frits Eriksson and each of the presenters. A presentation was also made to Mr Abdul Nasar bin Abdul Hadi, Principal Assistant Director Safety of Navigation Division and leader of the Marine Department Peninsular Malaysia secretariat team. After this the Secretary-General thanked Captain Ahmad bin Othman for Malaysia once again supporting IALA, this time at short notice. Following which he made a presentation.

Finally the Secretary-General thanked the delegates for their participation and hard work, saying that he hoped they had all benefited from the week. He then wished everyone a safe return home.

11.2 Remarks by Marine Department Peninsular Malaysia

Captain Ahmad bin Othman said that it had been a pleasure to host the seminar and that he was pleased at the success of the seminar and that he was willing to host a further event, if asked. He then made a presentation to the Secretary-general, followed by the presenters, IALA instructors and IALA Secretariat.

11.3 Closure

Ómar Frits Eriksson concluded proceedings by thanking everyone for their participation and he too wished everyone a safe journey home and expressed his hopes that he would soon see the results of their endeavours in the use of IWRAP Mk II. He then declared the seminar closed.

ANNEX 1 LIST OF PROGRAMS DOCUMENTS & PRESENTATIONS USED AND PROVIDED TO DELEGATES

IWRAP Program

- 1 grisksetup_v2_1_0.exe
- 2 griskmapsetup_v1_0_0.exe

IWRAP Documentation

- 1 20090419 IWRAP Manual 1.0.19.pdf
- 2 20090419 IWRAP Theory.pdf

Case Studies

- 1 20081106 Frederiksstad.xml
- 2 20099419 Drogden Channel Updated.xml

Test Cases

- 1 Test Case A.xml
- 2 Test Case B.xml
- 3 Test Case C.xml

Presentations – Monday

- 1 Introduction to PAWSA_Thibault
- 2 Introduction to IWRAP_Eriksson
- 3 Validation of IWRAP_MkII_Porthin
- 4 Introduction to GRISK_Engberg

Presentations – Tuesday

- 1 IWRAP_Theory and test cases_Benedict
- 2 Casualty data and IWRAP Mk2_Vågsholm_Lundkvist

Presentations – Thursday

- 1 The Malacca IWRAP Analysis_Eriksson
- 2 Malacca Strait using IWRAP_Eriksson
- 3 Hatter Barn Case Study_Eriksson
- 4 Bayesian Networks_Eriksson
- 5 IWRAP Theory and test cases_Benedict_Eriksson
- 6 Modelling effects of RCOs_Markus Porthin

Presentations – Friday

- 1 Last thoughts & wrapping up_Eriksson
- 2 Additional thoughts_Lundkvist
- 3 Way forward_Gatehouse

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ANNEX 3 SOCIAL EVENTS

- 1 On Monday, 20 April 2009, an evening reception for delegates and partners was held in the Berjaya Times Square Hotel and Convention Centre.
- 2 On Tuesday, 21 April 200, a gala dinner for delegates and partners, hosted by Marine Department Peninsular Malaysia, was held at Saloma Bistro, Kuala Lumpur.

ANNEX 4 SEMINAR PROGRAMME

Day 1 - Monday 20 April 2009

<u>Time</u>	<u>Activity</u>	<u>Presenter</u>	<u>Chair</u>
1200-1400	Registration / welcome tea and coffee		
1400-1420	Opening of the Workshop		Omar Frits Eriksson DaMSA
	Welcome address from Malaysia	Capt. Ahmad Bin Othman - Malaysia	
	Welcome address from IALA	Torsten Kruuse, Sec. Gen. of IALA	
	Administrative details	Mike Hadley IALA	
1420-1530	Session 1 - Introduction to the IALA Risk Management Toolbox		Omar Frits Eriksson DaMSA
	Presentation of the IALA Risk Management Toolbox	Torsten Kruuse, Sec. Gen. of IALA	
	An introduction to PAWSA	Dr. Marc Thibault USCG	
	Short introduction to IWRAP	Omar Eriksson DaMSA	
	Case studies for verification of IWRAP Mk II	Markus Porthin VTT	
	<i>Seminar Photo – prior to coffee</i>		
1530-1600	Coffee		
1600-1730	Session 2 – Installation IWRAP Mk II		Omar Frits Eriksson DaMSA
	Programme Installation Licensing Scheme	Per Christian Engberg Gatehouse	
	The IWRAP Mk II Software Demonstrate the basic parts of the software	Michael Skov DaMSA	
	Running your first IWRAP Test Case	All	

18:00 – 2000 Welcome Reception – Room Bronx V

Dress Code Smart Casual

Day 2 – Tuesday 21 April 2009

<u>Time</u>	<u>Activity</u>	<u>Presenter</u>	
0900-1030	Session 3 – Running IWRAP Mk II		
	Administrative details	Mike Hadley IALA	
	The theoretical foundation behind IWRAP Mk II (Part 1)	Omar Frits Eriksson DaMSA Knud Benedict University of Wismar	
	IWRAP Test Case A - One leg one ground polygon		
	Questions and Answers		
1030-1100	Coffee		
1100-1230	Session 4 – Running IWRAP Mk II		
	The theoretical foundation behind IWRAP Mk II (Part 2)	Ómar Frits Eriksson DaMSA Knud Benedict University of Wismar	
	IWRAP Test Case B - Two legs with bend two polygons		
	Questions and Answers		
1230-1400	Lunch – Room Bronx V		
1400-1530	Session 5 – Running IWRAP MkII		
	The theoretical foundation behind IWRAP Mk II (Part 3)	Omar Frits Eriksson DaMSA Knud Benedict University of Wismar	
	IWRAP Test Case C - Four legs with one bend one crossing and three area/polygons.		
	Questions and Answers		
1530-1600	Coffee		
1600-1730	Session 6 – Real Case Study		
	Gathering Casualty data	Markus Lundkvist SMA	
	Practical Case Study Example (Frederikstad)	Ronny Vågsholm NCA	
	Questions and Answers		

19:00 Transport from lower lobby

19:30 Seminar Gala Dinner

Dress Code: Smart Casual

Day 3 – Wednesday 22 April 2009

<u>Time</u>	<u>Activity</u>	<u>Presenter</u>	
0900-1030	Session 7 –More Complex Cases		
	Administrative details	Mike Hadley IALA	
	Review of previous day	Omar Frits Eriksson DaMSA	
	The theoretical foundation behind WRAP Mk II (Part 4) Causation factors	Omar Frits Eriksson DaMSA	
	Practical exercise on Causation factors and traffic changes - Case study (Hatter Barn)	Knud Benedict University of Wismar	
	Retrieving information from AIS data Example of AIS derived data (Malacca)		
	Further aspects of the IWRAP software Google Earth Polygon Generation Uploading results to the IALA FRP server	Per Christian Engberg	
	Questions and Answers		
1030-1100	Coffee		
1100-1230	Session 8 –More Complex Cases		
	MALACCA Strait Exercise	All	
1230-1400	Lunch – Room Bronx V		
1400-1530	Session 9 –More Complex Cases		
	MALACCA Strait Exercise (cont.)	All	
1530-1600	Coffee		
1600-1730	Session 10 –More Complex Cases		
	MALACCA Strait Exercise (cont.)	All	
	Questions and Answers		

Free Evening

Day 4 – Thursday 23 April 2009

<u>Time</u>	<u>Activity</u>	<u>Presenter</u>	<u>Chair</u>
0800-1300	Session 11 & 12 Technical Tour		
	Visit to MALACCA Strait VTS	All	
1300-1430	Lunch – Room Bronx V		
1430-1530	Session 13 – Individual Exercise		
	Revision of MALACCA Strait Exercise	All	
	Individual Exercises		
1530-1600	Coffee		
1600-1730	Session 14 – Individual Exercise		
	Individual Exercises	All	
	Questions and Answers		

Technical tour arrangements:

- 0800 Transport leaves lower lobby
- 0930 Arrive Malacca Strait VTS
- 0930 – 1130 Visit AIS and VTS facilities, splitting into three groups.
Refreshments will be provided.
- 1130 Transport leaves Malacca Strait VTS
- 1300 Arrive Berjaya Times Square Hotel & Convention Centre

Free Evening

Day 5 – Friday 24 April 2009

<u>Time</u>	<u>Activity</u>	<u>Presenter</u>	<u>Chair</u>
0900-1100	Session 15 – Further Discussion		Omar Frits Eriksson DaMSA
	Summary of MALACCA Strait Exercise		
	Conclusions and Recommendations	Mike Hadley IALA	
1100-1130	Coffee		
1130-1200	Session 16 –Closing of Seminar		
	Thanks from IALA	Torsten Kruse Sec. Gen. of IALA	
	Thanks from Malaysia	Capt. Ahmad Bin Othman - Malaysia	
1200	End of seminar		
1200-1400	Lunch – Room Bronx V		

ANNEX 5 SEMINAR CONCLUSIONS AND RECOMMENDATIONS

Conclusions

- 1 IWRAP Mk II is a useful and important tool for performing quantitative risk assessment in terms of incident rates in a waterway.
- 2 IWRAP Mk II can be expected to give satisfactory results if analysts are properly trained.
- 3 Selecting the correct causation factors is important and more work is needed to better understand them. However, the current IALA default causation factor values are considered robust.
- 4 Sharing results and findings, as well as details of how the analysis was done, will further develop an analyst's skills and ability to model the effect of different configurations of a waterway correctly.
- 5 There is a need for a number of reference projects to be provided to IALA to further the sharing of ways of modelling a waterway and validate causation factors.
- 6 Further investigation is required into the suitability of IWRAP Mk II to handle very narrow waterways including rivers as well as tugs and barges scenarios, taking into account current and tidal variations.
- 7 Full use of the IWRAP Wiki (<http://www.ialathree.org/iwrap>) should be encouraged.
- 8 The results of the Malacca Strait assessment, using IWRAP Mk II, should be forwarded to the Marine Department Peninsular Malaysia which should consider forwarding this to the Tripartite Technical Expert Group (TTEG - Malaysia, Singapore and Indonesia) for review and to consider forwarding any relevant findings to IMO.
- 9 The seminar encouraged the use of the IWRAP Mk II tool.
- 10 IWRAP Mk II should be seen in conjunction with PAWSA as the IALA Risk Management Toolbox.

Recommendations

- 1 IALA members are encouraged to use IWRAP Mk II to build basic models and then use these models to evaluate 'What if' scenarios.
- 2 Members should ensure that appropriate training is in place, in order to gain full benefit from the IWRAP Mk II quantitative risk assessment method.
- 3 The limitations of IWRAP Mk II should be made explicit and published in appropriate documentation.
- 4 Users should be encouraged to use the quantitative IWRAP Mk II tool, together with maritime expertise and appropriate qualitative risk assessment tools such as PAWSA.
- 5 IALA should develop a model course for training in the use of the IWRAP Mk II risk assessment tool.
- 6 The IWRAP Mk II tool should continue to be used by delegates to the seminar, in order to maintain user currency and promote its development.
- 7 IALA Members are encouraged to provide models, built by them, to IALA.

ANNEX 6 IWRAP RAP

Words and music by Knud Benedict, who introduced the song by saying “This is a sort of ‘wrap up’ of our IALA-seminar on the quantitative risk assessment tool IWRAP Mk II. Its style is in the form of a rap song – and it was, therefore named, IWRAP. Enjoy!”

Refrain: (to start with)

IWRAP – This is an IALA tool!

IWRAP – Keeps you smart and cool.

IWRAP – Better book a seminar!

IWRAP – Seminars make you a star!

Song Text:

If you ~~will~~ ever need some risk control,

There is a nice tool to save your soul.

It is simple and easy to use – maybe...

But better you should join our seminar to see:

Refrain:

IWRAP – This is an IALA tool...

We put a traffic leg here and we put a leg there
and then we add some traffic that might be to share.

And after some seconds – amazingly ...,

It turned all red! What could that be?

Refrain: IWRAP – This is an IALA tool...

You might have forgotten in our recipe,

There’s a man on the bridge - very luckily!

This human will be thinking probability

to improve the traffic – accidentally.

Refrain: IWRAP – This is an IALA tool...

Causation factors were blowing up our head.
How better should we call it; another name instead?
“Reduction of Default” – this was driving us mad.
Best we should name it “Omar’s Factor” – not so bad! 😊

Refrain: IWRAP – This is an IALA tool...

And now the week is over and our mission is done.
We had a lot of work - but also some fun.
Finally our thanks go to IALA,
And to our friends from Malaysia!

Refrain: IWRAP – This is an IALA tool...