

**11th CHRIS Meeting,
IHB, Monaco, 16-18 November 1999**

MINUTES

- Notes:* 1) *The paragraph numbering is the same as in the abridged agenda (Annex C) unless otherwise specified.*
2) *A list of acronyms is provided at Annex A.*

1. OPENING AND ADMINISTRATIVE ARRANGEMENTS

The Chairman (Rear Admiral Neil GUY, IHB) opened the meeting. Rear Admiral Giuseppe ANGRISANO (President, IHB) welcomed the participants (see CHRIS/11/1B). He briefly described current activities related to the development of Strategic Plan for IHO, particularly as it relates to other activities that IHO will become involved in addition to safety of navigation. Ing en chef Michel HUET (IHB), Secretary of CHRIS, explained the provision of CHRIS 11 documents (see CHRIS/11/1A).

2. APPROVAL OF AGENDA

The Chairman briefly reviewed the Agenda (see CHRIS/11/2A). There were no significant changes or additions. Dr Lee ALEXANDER (IEC TC80/MT1) was appointed Rapporteur for the Meeting.

3. MATTERS ARISING FROM MINUTES OF 10TH CHRIS MEETING

The Chairman reviewed the status of the action items resulting from the 10th CHRIS Meeting (see CHRIS/11/3B).

Note: The following is an update of the information provided in CHRIS/11/3B. Paragraph numbering () refers to the minutes of the 10th meeting.

Action Items

- (3. (8.2)) *HTML versions of S-57.* Ing en chef HUET reported that liaison had been established from the IHO web-site (www.iho.shom.fr/general/files/eedisnew.htm#htmlver) to two commercial companies' web-sites, where HTML versions of the S-57 Edition 3.0's Object Catalogue may be viewed. These companies are Universal Systems Ltd (Canada) and Blom Dantarsa (Norway/ Indonesia). He however recalled that the Official version of S-57 is the one available from the I.H. Bureau. Mr Gert BÜTTGENBACH (OEF) mentioned that an HTML version of the S-57's O.C. can also be downloaded from the Open ECDIS Forum (www.openecdis.org/objclasses/index.shtml).
- (10.2) *IALA Proposal on VTS Symbols for ECDIS.* Dr Christopher DRINKWATER (UK) provided an overview on what had occurred regarding the IALA proposal on VTS symbols. At this time, it is still not clear who is the IALA point of contact for technical matters, or what is the status of the proposal. Dr Alexander offered that this issue be discussed in more detail under the MIO agenda item.

- (10.3) *Amendments to IHO S-52, Appendix 2 (Colours and Symbols)*. The first two maintenance documents were promulgated on the IHO web-site earlier this year. The current edition of the IHO Presentation Library for ECDIS is Edition 3.1.
- (11.4) *ICA Publications*. Future publications of the ICA should mention the relevant web-site addresses, as appropriate.
- (13.1) *Product Specification for RNC*. It has been completed and promulgated in IHO Publication S-61. Dr. DRINKWATER pointed out that, in spite of the two raster formats currently in use, and possibly more in future, S-61 will not be affected as it does not specify format. This is a matter for issuing HOs.
- (15) *French version of IHO S-57*. Work is in progress.
- (16) *Meeting documents on IHO web-site*. CHRIS and WEND documents will not be put on the IHO web-site due their confidential nature, until they can be accessed by IHO Member States only. Only exception is final meeting reports. Ing en chef HUET explained that information on the status of ENC production worldwide would also appear in future on the IHO web-site.
- (16) *ENC verification tests*. This work, initiated by PRIMAR, but now proceeding as a TSMAD activity, is due for completion at the April 2000 TSMAD meeting. The Open ECDIS Forum has been used as a discussion forum. The results will be promulgated as an IHO list of recommended tests for ENC compliance.

4. CONSIDERATION OF THE FINNISH PROPOSAL TO RE-ARRANGE THE STANDARDISATION WORK WITHIN CHRIS

The Chairman referred to CHRIS Letter No 2/1999. He summarized that there are several issues:

- IHO S-57 is a large and complex standard;
- Possible need for full-time work on IHO S-57 (2-3 persons);
- IHO considering possible use of consultants.

He also explained that this proposal seems to not be compatible with the recommendations of the IHO Strategic Planning Working Group (SPWG).

Mr Juha KORHONEN (Finland) explained that the responses received have been mixed. Dr C. DRINKWATER added that the world is now moving fast and often requires solutions quickly. He wondered if, because of resource constraints, the existing IHO Committee and Working Group structure could respond fast enough. Possibly more use should be made of consultancies. It was also noted that IHO S-57 is a standard for a number of hydrographic applications (in addition to ECDIS), and the need to liaise with an increasing number of other groups is growing.

Mr Horst HECHT (Germany) pointed out that S-57 required a very large effort for IHO, but it has resulted in a major contribution to GIS. Also, it has now been completed and should be kept stable. He felt that it may be worthwhile to re-examine what is the on-going/future role of IHO as regards S-57. More specifically, he suggested that IHO needs to develop a list of tasks and a timeframe. Cdr Robert WARD (Australia) agreed and felt that the existing structure within IHO should be maintained. He further noted that attention should be kept on time-scale and housekeeping. Mr BÜTTGENBACH observed that IHO S-57 needs to be "marketed" in terms of its full capability, and used for other Marine GIS applications. In this regard, S-57 has still to evolve (e.g. need for a time

dimension). Mr George SPOELSTRA (Netherlands) felt that Marine GIS applications may go beyond the scope of IHO.

The Chairman felt that the role of the various CHRIS working groups could be rationalised in terms of addressing these additional issues and work (e.g. TAWG). Mr Doug BROWN (USA-NOAA) pointed out that the Strategic Planning WG, which met on the preceding week, dealt with this matter. He also suggested increasing the use of modern telecommunications means to improve CHRIS' work, e.g. video conferences. Mr BÜTTGENBACH, supported by Mr HECHT, stated that now that ECDIS is being type-approved, funds can be raised from industry to contribute to both the maintenance and promotion of IHO S-57 for use in Marine GIS applications. Dr DRINKWATER added that Academia might also contribute to this effort. In this regard, Dr ALEXANDER mentioned that there is considerable interest by some universities on ECDIS-related Marine GIS issues (e.g. the new Hydrographic Center at the University of New Hampshire, USA).

Mr Ole BERG (Denmark) remarked that the solution is not to change the structure. TAWG's excellent work is a good example of what should be done. He also recommended that, if the intention is to promote a closer relationship with the industry, selection of companies be made in a careful and impartial way.

Comdre. John LEECH (IHB) commented on the issue of Marine GIS and how it is being addressed within the Strategic Planning WG. He also described the on-going effort by the IHB to direct resources toward IHO S-57. Mr BROWN also mentioned the benefits of a secondment to IHB to support this work.

Mr Mike CASEY (Canada) pointed out that the real task at hand within IHO is the use of IHO S-57 to produce ENC data. Mr BERG agreed that the core business of IHO is navigation safety, and that there is a need to prioritise on what needs to be done first.

The Chairman summarised that the existing IHO structures were in principle satisfactory but may require some house keeping changes. He added that this is a matter that will require further consideration at the occasion of the IHO - Industry Interface Workshop in March 2000, at which possible industry funding will be a major consideration.

Action: IHB

5. REPORT ON MSC 71 AND NAV 45

5.1 SOLAS Chapter V

The Chairman summarised what occurred prior to and during IMO NAV 45. An IHO Circular Letter (CL49/1999) was sent. In the report by IHO NAV 45 to MSC the term "official" when used with nautical charts appears in "square brackets." In a subsequent CL, Member States have been requested to indicate whether this term is still required.

He also recalled that HO's should contact their national delegates to IMO's meetings, and brief them conveniently on technical matters, with a view to agreeing on a common IHO position.

5.2 IMO Curriculum on ECDIS Training Courses for Mariners

Dr ALEXANDER (IEC) briefly described the IMO Model ECDIS training Course that was adopted by IMO STWC in January 1999.

6. ECS DEVELOPMENTS

The Chairman explained the IHB position regarding ECS Performance Standards and ECS data standards as discussed in an IHO Letter to ISO dated 27 May 1999 (see CHRIS/11/6A). He provided a diagram that showed the relationship between paper charts, ECDIS, ECS and a possible Electronic Smallcraft Chart (ESC) (see CHRIS/11/6B). In particular, it indicated the various types of product specifications that IHO could define. Dr. DRINKWATER stresses that ECDIS in the RCDS mode together with an appropriate folio of paper charts is an acknowledged IMO solution described in Appendix 7 of the ECDIS Performance Standards. ECS with paper charts are not recognized by IMO. The two solutions are not the same.

Mr HECHT did not feel that there was a compelling need for IHO to become involved in an IHO Product Specification for an EC (Electronic Chart) or ESC. Dr DRINKWATER agreed and felt that IHO should only focus on those Performance Standards that IMO has approved (i.e., ECDIS and RCDS). RAdm ANDREASEN (USA-NIMA) agreed and felt that ECS was a national matter. Cdr Ward also felt that this was not necessary, and would lead to further confusion as to what is ECDIS versus ECS.

Lt Cdr Rosario LA PIRA (Italy) reported on the Italian Administration/HO's developments in this field. In August 1999 the Italian Administration adopted an amendment to the current non-SOLAS national carriage requirements for pleasure and coastal fishing boats concerning the nautical chart. The amendment allows the substitution of paper charts with an ECS compliant with the Performance Standard that will be adopted based on the technical indications given by the Italian HO. Over the last few months, the Italian HO has been working on drafting a so-called "Approved ECS PS" based on the RTCM Standard for ECS, with some specific amendments. The ECS approval procedure will be through manufacturer self-certification.

When asked, Dr ALEXANDER and Mr BÜTTGENBACH explained the perspective of RTCM and "industry" on this matter. RTCM was continuing work on refining a minimum ECS Performance Standard, while the need for an international ECS data standard was under consideration by ISO (ISO/TC8/SC6 N32). Dr DRINKWATER considered it unfortunate and confusing that the RTCM ECS standard no longer made it clear that ECS is not intended to meet a vessel's SOLAS obligations. All felt that at this time, there was not a need for IHO to develop standards for EC or ESC.

The Chairman summarized that the development of an IHO standard for ECS data was not required.

7. REPORT ON THE ENC UPDATING WORKSHOP

The Chairman briefly explained the outcome of the IHO Updating Workshop held in Mobile, Alabama, USA, in May 1999 (see CHRIS 11.7A). Mr HUET described the status of IHB actions items resulting from the Workshop.

7.1 Re-establishment of an Updating Working Group

Mr HECHT questioned the value of re-establishing an Updating WG. For instance, TSMAD can deal with the actual ENC Updating Profile. Dr DRINKWATER agreed, but suggested that more field experience was needed before further specifications or guidance should be developed. The Chairman suggested that there are both technical and service issues involved. He remarked that TSMAD could work on technical issues whereas the IHB would deal with the administrative ones. Mr HECHT suggested that PRIMAR might be a good way to gain experience. Mr BÜTTGENBACH stated that industry was interested in the development of a consistent and uniform infrastructure for ENC updating. As such, the establishment of an IHO-industry "Expert Group" that could advise IHO on the best means or process for ENC

Updating, may be a useful approach. Mr CASEY agreed that the establishment of an ECDIS industry group that provides advice to IHO would be useful. Dr DRINKWATER reminded delegates that whilst industry could play a role, the prime responsibility for updates, their frequency, method of promulgation, etc. rested with HOs. Cdr WARD offered that, at this stage, “we don’t know the answers since we are just discovering the problem”, and suggested that the Open ECDIS Forum may be an option. However, Mr BUTTGENBACH stated that the primary role of OEF was to raise and discuss issues, not a means to solve problems or to derive a new approach.

The Chairman asked that if an Updating WG is re-established, what would be the tasks or terms-of-reference? Dr ALEXANDER explained the difficulty that IEC TC80/WG7 and ECDIS type approval authorities had in dealing with the so-called “guidance” contained in IHO S-52, Appendix 1. He suggested that a thorough review and condensing (reduce and simplify) of the existing S-52, Appendix 1 into a useful set of minimum specifications could be a first step. A second step would be to revise and produce a new edition based on experience gained. However, this could be performed without the re-establishment of an Updating WG.

Mr BÜTTGENBACH felt that S-52, Appendix 1 could even be withdrawn, and that industry experience could form the basis of a new procedure or guidance on ENC Updating. He did not think that re-establishing an Updating WG was necessary. Mr Robert SANDVIK (PRIMAR) emphasised that the end user experience was crucial. Mr HUET pointed out that S-52, Appendix 1 was specifically mentioned in the IMO Performance Standards, and that IEC 61174 contained tests based on IHO S-52, Appendix 1. Dr DRINKWATER suggested that prior to making any amendments to S-52, Appendix 1, clear objectives were required beforehand. He also reminded members that a key decision of the Mobile Updating Workshop was that any changes to current procedures should be based on user requirements, not technological capability alone.

The Chairman summarized:

1. Primary task is to establish minimum requirements for updating.
2. PRIMAR could be a basis for experience gained (Technical Experts Group).
3. IHB will host an Updating Meeting or Workshop in conjunction with the next PRIMAR Technical Experts Meeting (29-31 May 2000, IHB, Monaco), to seek industry and HO advice and/or recommendations on ENC updating. (On enquiry by Mr BÜTTGENBACH) the Chairman confirmed that this would be an IHO, not PRIMAR, meeting/workshop.
4. A report on this Meeting will then be provided to CHRIS.
5. Any revisions to Appendix 1 would follow.

Production, dissemination, and implementation should be the major topics addressed. This Updating Meeting/Workshop will be chaired by RAdm Neil Guy. Dr. DRINKWATER recommended that matters to be discussed should be identified in advance of the meeting

Action: IHB

8. STATUS OF IEC 61174

Dr ALEXANDER briefed on the status of work of IEC related to ECDIS (see CHRIS 11/8A). IEC TC80/WG7 is no longer in existence, and future work on IEC 61174 will be performed by a new TC80 Maintenance Team One (TC80/MT1). Mr Michael RAMBAULT (IEC TC80 and CIRM) has replaced Mr Peter GRIFFITHS as Secretariat to TC80. Cdr Dan MADES (U.S. Coast Guard) is the Convenor for TC80/MT1. The first meeting of MT1 was in July 1999. Seven tasks were identified

including, RCDS, back-up arrangements, navigation-related symbols, colour calibration procedures, ENC test dataset, and encryption.

Dr ALEXANDER explained how IEC TC80/MT1 viewed encryption as something that could have implications to IEC 61174 and type-approval. He showed a diagram that indicated the difference between de-encryption process occurring outside the ECDIS versus inside. Cdr WARD felt that encryption/de-encryption went well beyond what was called for in a type-approved ECDIS. There was additional discussion on what the possible impact of encryption would be on an ECDIS type-approval process. At this stage, IEC TC80/MT1 is just monitoring developments on this matter.

8.1 IHO ENC Test Data Set

Dr DRINKWATER explained the status of the IHO ENC Test Data Set (TDS) for IEC, and IHO tests for ENC conformance. He also explained that an index is being prepared. While the ENC TDS is a tangible outcome of the S-57 ENC Product Specification, it cannot provide for all situations or circumstances. There may be a need to provide additional test dataset examples. He also mentioned that once a new edition of IHO S-57 is published, i.e. Edition 3.2 or 4.0, there may be a need for modification of IEC 61174. See also section 3 (16). Mr BÜTTGENBACH recommended to keep the TDS as stable as possible.

The issue of the PRIMAR test dataset was discussed. Mr Robert SANDVIK (PRIMAR) explained that the PRIMAR ENC test dataset is basically the same as the IHO ENC TDS, but provides additional examples.

Dr DRINKWATER also explained what has been done regarding the concerns raised by Norway's letter to IHB (see CHRIS/11/8.1A). He felt that the most of the problems reported on the TDS were due to misinterpretations of the ENC Product Specification.

The Chairman summarized:

The IHO ENC Test Data Set (TDS) satisfies the requirements listed in IEC 61174, and is being used for ECDIS type-approval process. In addition, PRIMAR test dataset is a useful complement to the official IHO TDS. However, future developments may require the updating of IEC 61174 and the IHO TDS, and additional tests would be required.

9. REPORT ON THE 4TH WEND COMMITTEE MEETING

The Chairman briefly reviewed the Summary Report of the 4th WEND Meeting in Sydney, Australia, on 27-29 January 1999 (see CHRIS/11/9A). In particular, he briefed on the status of technical issues related to production and distribution of ENCs.

9.1 ENC/RNC Encryption and Pricing

Mr SANDVIK explained that the primary purpose of the PRIMAR ENC encryption was to develop a security scheme to provide authentication, and to protect the ENC data from unauthorized copying, use, or alteration.

Mr CASEY introduced the Draft Report prepared by the TAWG: "*Encryption and ENCs – The Technology and Policy Issues*" (see CHRIS 11/12.4A). The report lists the five objectives as well as a number of impediments to achieving a security scheme. The report provides general options for implementing a security system scheme, as well as describing some of the ethical and legal dilemmas that could be encountered. Mr Casey also described an ENC / SENC security scheme that could be performed by manufacturers outside the ECDIS.

The recommendation of TAWG is to wait-and-see for two years, and then re-evaluate. Many thought that such a delay was unacceptable.

Mr SANDVIK briefly described the PRIMAR Model and approach. He mentioned that a security scheme documentation and test kit had been developed, and was being provided to ECDIS manufacturers. It could also be made available to HOs. He then responded to a number of questions/issues raised concerning the PRIMAR's encryption approach and process:

1. Whether BLOWFISH was an ISO or industry standard? *Response: industry.*
2. BLOWFISH is only a 40 bit key (state-of-the-art is currently 1,024 bits). *Response: BLOWFISH can use between 1 and 448 bits.*
3. Users are concerned about temporary licenses (i.e. how long will this encryption process will be in effect?). *Response: there will be a grace period, i.e. use of ENC data will be permitted during a limited period of time after the temporary license has expired.*
4. Will the PRIMAR encryption scheme become a part of the type-approval process? *Response: it will be up to IEC to decide (e.g. whether it occurs inside or outside the ECDIS).*
5. What ECDIS manufacturers are "supporting" the PRIMAR security scheme? *Response: three ECDIS manufacturers have demonstrated the ability to encrypt/de-encrypt ENC data.*

RAdm ANDREASEN pointed out, referring to Section 4.5 of the draft Report in CHRIS/11/12.4A, that it was not appropriate for IHO to make a decision on what information is, or is not, critical and should therefore be encrypted or not.

Mr Adam KERR (UK) felt that the fundamental question is whether ENC encryption is really needed or acceptable? Mr Tonis SILANARUSK (Estonia) expressed a similar concern. The majority felt that encryption is needed.

In response to a question on how IEC will deal with encryption, Dr ALEXANDER responded that while encryption is currently on the list of tasks for IEC to monitor, no action will be taken unless it becomes an IMO or IHO standard. The current approach for TC80/MT1 is to "wait-and-see".

The Chairman asked how many HOs would like the end-user to receive un-encrypted ENC data. Three indicated this was their preference. Cdr WARD noted that CHRIS needs to establish direction on what is, and is not, acceptable in terms of security schemes, protection, and encryption. Ideally, policy guidance should be developed on this matter. After that was completed, some decision could then be made on what type(s) of method(s) are acceptable. Mr HECHT stated that if encryption is deemed acceptable, then some mention needs be made in IHO S-52. Dr DRINKWATER observed that the option of encrypting data is specifically mentioned in the ENC Product Specification.

Mr BÜTTGENBACH suggested there are really three issues: digital signature /authentication, access control, and copy protection. He further expressed his concerns about using for encryption purposes an algorithm of public domain, and that any de-encryption method should be performed inside the ECDIS, thus increasing the associated costs.

The Chairman summarized:

- If encryption is introduced, it should be as standardized as possible.

- IHO will eventually need to establish a position on this matter.
- A policy should be established before technical details can be decided upon.

He suggested that it might be useful to have a small team developing a list of requirements and suggesting a framework related to security scheme, and reporting back to CHRIS. Mr CASEY (Team Leader), Mr BÜTTGENBACH, Mr SANDVIK, and Mr René van GEESBERGEN (Netherlands) had discussions in the frame of the Meeting and Mr CASEY reported back that they would need to continue their efforts following the CHRIS Meeting. They would report to IHB as soon as possible.

Action: Mr Mike CASEY

9.2 ENC Delivery and SENC Conversion

The Chairman introduced a one-page description related to the direct use of a SENC by an ECDIS and the present wording in S-52 (Section 3.3) on ENC and SENC (see CHRIS/11/9.2A). Distribution of ENCs in a SENC format would be in addition to (not instead of) the ENC → SENC transformation that is called for in Section 2.3 of the IMO Performance Standards. The Chairman stated that the IMO PS was clear on this matter; it only permits ENC to SENC conversion in the ECDIS. Mr BÜTTGENBACH responded that the IMO PS are minimum performance standards, and that the direct read of SENC can be viewed as a practical, additional back-up to the ENC that provides increased reliability. The Chairman suggested that this would have implications to IHO S-52, sections 3.3 (c) and (d). Mr Alexis HADJANTONIOU (Greece) felt that there was no need to change IHO S-52 to accommodate this process. Mr Ole BERG (Denmark) mentioned that this matter of using SENC information was discussed three years past (IHO ENC/SENC versus NIMA VPF/DNC).

Mr HECHT suggested that SENC conversion is also an appropriate distribution process. It should be considered as an additional, customized service (e.g. plug-and-play, complete route coverage) that would be in addition to official ENC distribution. In this regard, the Chairman displayed a revised diagram showing this process. Dr DRINKWATER pointed out that the combination of commercial data and ENC did not require the ENC to be delivered in a SENC format. Mr Doug BROWN (USA-NOAA) suggested that IHO needs to consider the user's perspective and not focus mainly on the distributor. With this in mind, he indicated that SENC conversion ashore reduces the risk to the mariner of data compatibility problems that may result when ENC data are converted in the ECDIS box. Mr Shinichi KIKUCHI (Japan) stated that JHD does not allow SENC distribution at this time. He further stated that while SENC distribution may be technically acceptable in the overall ENC distribution system, a HO or RENC should deny allowing SENC distribution if they cannot take responsibility for the SENC.

Mr BÜTTGENBACH asked that CHRIS make a decision on when a SENC conversion and distribution could take place. He felt that there are good business reasons why the conversion could take place outside of the onboard ECDIS. (e.g. service efficiency and reliability, packaging, updating service, legal implications, etc.).

RAdm ANDREASEN stated that NIMA intends to go to USCG within six months to gain national recognition that NIMA's SENC (VPF/DNC) conform to the IMO Performance Standards, and that this matter is a national decision. Lt Cdr LA PIRA stated that the Italian HO's main concern is to produce and release ENCs and to leave both options as regards distribution, provided that there is no technical change in the overall type approved process. The Netherlands and Denmark agreed that this is a national decision in national waters.

Cdr WARD expressed concern that a SENC that was converted and distributed to an ECDIS by a distributor (and not derived by ENC transformation within the ECDIS) would result in an “ECS”. If this were the case, then S-52, section 3.3 would need to be changed. UK, Denmark, Greece, and Chile supported the concerns expressed by Australia. Mr HECHT expressed concern that different interpretations can cause problems. The various IHO specifications need to be clear. In this regard, Germany will investigate the advisability of an amendment to section 3.3 (d) of S-52.

Lt Cdr PEREIRA (Chile) conveyed Chile's opposition to any SENC delivery, noting that whereas this concept could possibly be valid for a RENC, it is inappropriate to countries like Chile, which deliver only official copies of ENC's.

The Chairman summarized:

- At present, in accordance with S-52, section 3.3 (d), ENC transformation into a SENC must occur within the onboard ECDIS.
- SENC distribution would not therefore comply with IHO standards and would degrade an ECDIS to an ECS.
- In any case SENC distribution, if allowed, would be in addition to and not instead of ENC distribution.
- Data compression is not allowed by S-57, and security schemes are not addressed in S-52. If these are deemed necessary, then suitable proposals should be made.
- Any amendments to S-52 or S-57 to facilitate the use of ECDIS should be the subject of well-motivated proposals to CHRIS for consideration.

10. PROJECTS OF INTEREST TO CHRIS (E.G. SHARED OR TENT-T)

- a) **SHARED** - Cdr WARD briefly described what occurred at the 3rd SHARED Meeting (see CHRIS/11/10A).
- b) **TENT-T** – Mr HUET explained that this three-year European Union project is a follow-on to COST 326, and is related to ENC production. It is under the Trans European Union “umbrella”. It is coordinated by France and UK. David MACPHERSON (UK) and Jean-Louis BOUET-LEBOEUF (France) are the points-of-contact on this project.

11. OPEN ECDIS FORUM

Mr BÜTTGENBACH briefly described the establishment of the Open ECDIS Forum (see CHRIS 11/11A). A Board of Patrons has been appointed for two years (seven persons). Seven topic areas are currently under discussion, including SCAMIN, matrix data, ENC validation checks, TVO/MIO, TAWG, C&S specifications, and the Board of Patrons discussion group. He did mention that long-term financing was a matter that will need to be eventually addressed.

Chairman stated that the IHB would monitor the financial situation of the OEF and, if necessary, investigate alternative funding.

*Action: IHB***12. REPORTS BY CHRIS WORKING GROUPS****12.1 Data Quality (DQWG)**

Cdr WARD explained that this WG has been inactive (see CHRIS/11/12.1). There are no outstanding work items. He proposed that the DQWG become dormant. Dr DRINKWATER asked if HOs were using the CATZOC in their ENC production process. Mr BERG stated that Denmark were at this time focusing on ENC production and QC/QA. However, when this task is completed they will focus on the application of CATZOC and SCAMIN.

It was decided that the DQWG would become dormant and that RAdm GUY would assume chairmanship during the dormant period.

*Action: IHB***12.2 Transfer Standard Maintenance and Applications Development (TSMAD)**

Dr DRINKWATER reported on the work of TSMAD (see CHRIS/11/12.2). S-57 Edition 3.1 will be made available in November 1999 for a one-year familiarization period. He explained that Member States would receive a detailed Circular Letter, including a CD-ROM with files in PDF format and an explanation for all the changes involved in Edition 3.1. It will be formally released in November 2000 and will then be frozen for at least two years. The differences between Editions 3.0 and 3.1 are minimal. The current edition of S-57, Edition 3.0, is maintained by means of a cumulative "Maintenance Document", which is published after each TSMAD meeting, and this procedure will continue with Edition 3.1. The matter of different ENC QA software giving different answers is primarily related to misinterpretations of IHO S-57 and the ENC Product Specification. A set of IHO recommended tests and check procedures, for ENC conformance is being developed to assist ENC QA software producers. See also section 3 (16).

Dr DRINKWATER asked Mr RAMBAULT to comment on how IEC can address changes which might be required to the IHO Test Data Set and the tests in IEC 61174. Mr RAMBAULT advised that IEC have a means to accommodate these changes. Publicly Available Specifications (PAS) are technical specifications that do not conflict with existing International Standards (e.g. IEC 61174). A PAS can be introduced by any Principal ("P") or Advisory ("A") member (e.g. IHO), and can be issued within a short time. It would include a double stamp (IHO-IEC). The PAS review, voting and publishing process usually takes only 3-4 months. In contrast, the normal IEC publication process for producing new editions (Committee Draft for Voting - Draft International Standard - Final Standard) is usually 2-3 years. Mr RAMBAULT also explained that if IHO develops additional specifications that may require testing, these should be brought to the attention of IEC, and placed on the work program of IEC TC80/MT1. (On enquiry by Dr DRINKWATER) he confirmed that a clarification note from the IHB would then be needed. Further discussion was made on how changes to IHO specifications may, or may not, affect the IEC required tests as specified in IEC 61174. Mr HUET pointed out that the publication of IHO S-57 edition 3.1 would likely require review by IEC TC80/MT1. Dr DRINKWATER explained that the new attribute values in S-57 Edition 3.1 are encoded in such a way that they will not cause a problem to an ECDIS type approved using Edition 3.0 data.

12.3 Colour and Symbol Maintenance (C&SMWG)

Mr Julian GOODYEAR (Canada) reported on the results of the recent C&SMWG Meeting (see CHRIS/11/12.3A). He made the following points:

- In the past, C&S specifications were not adequately tested at-sea due to lack of ENC data coverage and IMO-compliant ECDIS installations onboard vessels.
- S-57 ENC data is judged by its presentation; as such, it can be difficult to determine if there is a problem with the ENC data, display specifications, or ECDIS system.
- Many North American users are reluctant to adopt the IHO C&S specifications (or Presentation Library).
- There is a need to keep the C&S specifications as stable as possible during the next 2-3 years.
- Good input has been gained from type-approval authorities (e.g. BSH) on what does, or does not, work (e.g. on colour calibration procedures).
- There is a need to reduce and simplify the complexity of C&S specifications.

He further added that there would be two main thrusts during the next year:

- 1) Simplification of the C&S specifications.
- 2) Along with IEC, to examine the suitability of reducing the number of colour palettes, possibly to one (more universal) for use in varying light conditions.

The Chairman suggested that private industry should be asked to provide recommendations. Mr HUET explained that the PL Fund could be used to finance this type independent assessment and the resulting amendment work on the PL.

Mr GOODYEAR introduced the new Draft Terms of Reference for the C&SMWG (see CHRIS 11/12.3B). He added that the main focus would be on SENC display issues. A discussion followed on membership. Mr BERG observed that membership to IHO CHRIS WG's was of IHO Member states, others attending should be considered as observers or participants. RAdm ANDREASEN made an analogy with "observers" in organisations like IALA or IMO, and he proposed to use same term. Lt Cdr PEREIRA agreed and recommended to use similar sentences in all CHRIS WG's TOR, as regards membership, in order to avoid misunderstandings, e.g. differences observed between draft TOR for C&SMWG and SNPWG. The Chairman confirmed that this was the current IHO policy. New wording was developed for Section 4 (Composition and Chairmanship).

Mr SPOELSTRA supported the new objective of the C&SMWG (focus of the SENC), and suggested that the name of the Presentation Library reflect this focus. Dr DRINKWATER (UK) expressed the concern that in the future there may be different presentation libraries for different purposes, e.g. ENC, VTS, etc., and this would require very careful co-ordination.

The Chairman summarised as follows:

- The amended TOR's were approved.
- The IHB and the Chairman of C&SMWG would obtain industry reaction to the PL and, if it were necessary for amendments to be made to the PL, this would be referred to C&SMWG for action.

Action: IHB

12.4 Technology Assessment (TAWG)

Mr CASEY referred to the report of this WG (see CHRIS/11/12.4A). Much had been covered during the discussion that had occurred during the discussion of encryption during Agenda Item 9.1.

12.5 Standardisation of Nautical Publications (SNPWG)

The Chairman summarized the results of the recent SNPWG Meeting (see CHRIS/11/12.5A). There is a need for a Chairman and a Secretary for the SNPWG. Ing en chef HUET suggested that, as the DQWG is to become dormant, its Chairman, Cdr WARD, who also is a member of SNPWG, might be a suitable candidate for SNPWG chairmanship. Mr SPOELSTRA felt that there would be close relationship between SNPWG and Marine Information Objects (MIO). Proposed Terms of Reference were introduced and approved (see CHRIS/11/12.5B), with a programme and a timetable to complete the task. The issue of Chairman and Secretary would be addressed by the IHB.

Action: IHB

13. LIAISON WITH OTHER GROUPS

13.1 DGIWG

Mr PHARAOH reported on the work of this group (CHRIS 11/13.1A).

13.2 ISO/TC211 (Geographic Information/Geomatics)

Mr HUET reported on the on-going liaison with ISO to have IHO S-57 become a profile of ISO/TC211 standards (see CHRIS 11/13.2A). A consultant for IHB will look into this matter and report to TSMAD next year. Dr DRINKWATER expressed concern that the IHO might lose control over S-57 if it becomes an ISO standard. He recommended carefully studying the matter before any decision is made. The issue was raised on whether IHO should enter into a more formal arrangement with ISO, e.g. through a Memorandum of Understanding. Mr HUET also discussed the progress on harmonizing IHO S-57 to DIGEST 2.0 (see CHRIS 11/13.2C).

Mr Per-A. JAKOBSEN (Norway) and Mr KIKUCHI attended and represented the IHO at the 9th TC211 Meeting, which took place in Kyoto, Japan, on 29-30 September 1999. Mr KIKUCHI reported on the Meeting (see CHRIS 11/13.2B and 13.2D).

13.3 ICA Commission on Spatial Data Standards

Mr HUET reported on the work of this commission (see CHRIS/11/13.3A). Mr HECHT commented that IHO S-57 could be used for a wide range of applications related to GIS (e.g. VTMISS, River ECDIS, MIOs, etc.). Dr DRINKWATER commented that each new application would probably require its own product specification. Experience with ENC has shown that the production of a product specification can be very resource intensive, requiring liaison with various external organisations. Comdre LEECH commented that the World Bank, when providing assistance to developing nations, seems to be more focused on marine environmental protection and inter-modal maritime transportation rather than navigation safety.

13.4 IHO WG on Standards for Hydrographic Surveys (S-44) (about Standard Exchange Format for Hydrographic Data)

The Chairman introduced the results of an IHB Circular Letter that contained a questionnaire on standard exchange format for hydrographic data (see CHRIS/11/13.4A). Ing en chef HUET explained that this pertained to information traditionally not shown on charts (e.g. bathymetry, tides, bottom structure, gravity, side-scan sonar images, etc.). With the exception of the USA, initial response has been positive (see CHRIS/11/13.4B).

Ing en chef HUET noted that the oceanographic community has been using the GF3 and MGD77 formats to transfer bathymetric and geophysical data. These formats were developed some 20 years ago and are not in line with modern geospatial standards.

14. VECTOR DATA DEVELOPMENT

14.1 European RENC (PRIMAR)

Mr SANDVIK provided a briefing on the creation, objectives, and future plans of PRIMAR (see CHRIS/11/14.1A). PRIMAR is the organization and service for the Northern Europe RENC. Eleven HO's currently participate. A description of the ENC services, including the security scheme, was provided.

PRIMAR's pricing scheme for ENC data and updating service was explained. Price levels will be based on coverage related to size of paper chart (area of coverage). The cells will be divided into groups (large, medium, small) relating to the paper chart size. PRIMAR will only set the price to the Distributors (wholesale). The ENC will be a one-time price, while the updating is per year. This is illustrated in the table below.

(in US dollars)			
	% of PC	ENC	Update
High	61-100	\$46.40	\$32.00
Med	31-60	\$27.80	\$19.20
Low	1-30	\$13.90	\$9.60

There is a difference between Distributors (who supply official ENC data) and Service Providers (who produce value-added electronic chart products). PRIMAR is liable for its products, but not for official ENC data provided by participating HO's.

Dr ALEXANDER raised the question as to what is really meant by referring to ENC in terms of "paper-chart-equivalent". Mr BÜTTGENBACH suggested that there are both a regulatory meaning (i.e., SOLAS requirements) and marketing/packaging issues involved. It was suggested that navigational purpose categories (General, Coastal, Approach, and Harbour) were a useful means to describe ENC coverage and availability. At this stage, paper chart equivalence "coverage" equates to ENC coverage.

14.2 ENC Development in HO's represented at the Meeting - National Reports

Note: the following information is in addition to that provided in the various National Reports (see CHRIS/11/14A).

Australia – They will not start commercial release of Australian ENC's until 2001. In the meantime, these ENC's will be available for test and evaluation at no cost.

Canada – Distribution is through NDI and certified distributors (approx. 8). At present, there is no North American RENC. ENC's are priced at US\$50 per “paper chart equivalent”.

Chile – Over the past year, focus has been on ENC production along two main continuous routes. Commercialisation of ENC's will start in January 2000, with price at US\$35 per ENC per “paper chart equivalent”. Distribution will be by Chilean HO (SHOA) using CD-ROMs. Updates will be sent by e-mail. Sea trials will continue on an ECS installed, from November 1999, on-board the Chilean Navy transport ship "Aguiles". For 1999, 18 of the 33 ENC's that have been produced are commercially available.

Denmark – Primary focus has been to accomplish ENC coverage needed for international shipping to the transit through Danish waters and to major Danish harbours. This will be completed by the end of 1999. Distribution and updating will be carried out through the cooperation with PRIMAR.

Estonia – One ENC in 1:100,000 scale is planned to be released in year 2000. Most ENC data previously produced by Soviet Union are in S-57 version 2. They have data exchange with Latvian HO.

Germany – Primary focus has been on large scale ENC's for Baltic waters. North Sea areas will start in year 2000. The German Maritime Administration will soon decide upon what constitutes an adequate portfolio of paper charts to be used with RNC's. Most German ENC cells would be considered “large” in terms of the PRIMAR classification scheme.

Greece – The “Greek ENC Product Specification”, as mentioned in CHRIS/11/14A, should really be called a “coding guide”.

Italy – Official release of ENC will occur in year 2000.

Japan – Price of CD-ROM with small scale ENC's is US\$950. The Japan Hydrographic Department (JHD) and the Japan Hydrographic Association (JHA) will start, in April 2000, a two-year study project on on-line supply and encryption of ENC data. CD-ROM with large scale ENC's is \$450. ENC updating service is \$45 per month. In the future, an ENC cell can be sold on demand.

Netherlands – Some of the ENC's produced by PRIMAR were not satisfactory, and the Netherlands HO will produce themselves.

Sweden – They are currently working on developing an ENC updating process.

United Kingdom – Current ENC data is available for evaluation purposes. They have some concerns about certain aspects of ENC production process, and wish to resolve prior to official release in spring 2000.

United States–NOAA – 124 ENC cells are to be completed by September 2000. They will be distributed by commercial company MapTech along with an updating service. It is planned that ENC data will be provided along with RNC data on 18 Regional CD-ROMs, at no additional charge. This would be approximately US\$500 per CD-ROM containing 40-60 RNC's and ENC's, including a one-year subscription to the weekly update service. Where required, the ENC data can be provided in metric units. At this time, there is no North American RENC. However, there is an effort to harmonise methods of distribution between that of USA and Canada. Also, the Caribbean & Gulf of Mexico area may represent an opportunity to establish a RENC. There is also an effort to develop a “River Chart ENC” for major inland river systems.

14.3 ENC Development in HOs not represented at the Meeting

China, India, Rep. of Korea, New Zealand, Singapore and Ukraine – No further information to the 1998 report has been provided.

Russian Federation – Note was taken by Australia that worldwide ENC coverage does not appear to follow WEND principles.

Peru and Cuba. (On enquiry from RAdm ANGRISANO) it was confirmed that no report had been received from these HO's, both represented on the CHRIS Committee.

14.4 DNC Development in USA – National Imagery and Mapping Agency

In the future, there is plan to go to a “one-feature at one-time” approach in terms of a DNC “feature foundation data” concept. However, there is also a move to go toward object-oriented data. Denmark commented on the positive development regarding negotiations with other countries on access to DNC (see item 9 of NIMA Report in CHRIS/11/14A). In this regard, RAdm ANDREASEN indicated that conversations for bilateral agreements had started with Australia and Norway. He also mentioned that DNC chart data is metric.

NIMA are not selling DNC's and no updating method is yet in force, although there are plans to update monthly both DNC's and paper charts via Internet.

15. RASTER DATA DEVELOPMENT

15.1 RNC Development in IHO Member States

UK, USA, and Australia all reported that RNC coverage and availability are the same as reported as last year. Beginning in November 1999, NOAA/Maptech now offers an RNC updating service. Australia uses the ARCS format and intends to provide a dual-fuel service (RNC and ENC). (On enquiry by Horst HECHT) it was confirmed that official raster data was being distributed in SENC format.

16. MARINE INFORMATION OBJECTS (MIO)

Dr ALEXANDER provided a briefing on the results of the recent MIO Workshop on Burlington, Ontario, Canada (see CHRIS/11/16A). In particular, he explained how the MIO Group made a distinction between chart-related and navigation-related information. Using the same approach as what is contained in the IMO Performance Standards for ECDIS, chart-related information can be considered HO-provided while navigation-related pertained more to non-HO provided information such as own-ship, radar/ARPA, AIS, and VTS. A MIO Decision Tree was introduced (see CHRIS 11/16B). It indicates how the MIO Group will deal with various types of marine information objects (e.g. water levels, currents, ice information, etc.). In using the decision tree, four questions must be considered: source of information, responsibility for providing, means of distribution, type of display (chart- or navigation- related). The display of chart-related colours and symbols are specified in IHO S-52, Appendix 2, while navigation-related symbols are specified in IEC 61174, Annex E.

The Chairman recommended that the most important MIO's be prioritised before they are considered for evaluation by the IHO.

16.1 Formalizing the relationship of MIO to CHRIS

At the recent MIO Workshop, Mr Dan PILLICH (SevenCs) announced that he wished to step down as Chairman of the MIO Group. He suggested that a new IHO-IEC Harmonising Group on MIO for ECDIS (HGMIO) be formed, and chaired by Dr ALEXANDER (IEC TC80/MT1). Terms of Reference will be drafted for consideration by CHRIS and IEC. In the interim, four MIO Work Teams were established (ice information, AIS & VTS, meteorological, and tides & currents).

The Chairman (of CHRIS) will formally contact the IEC TC80 Secretariat

regarding the possible establishment of an IHO-IEC Harmonising Group on MIOs for ECDIS and to agree on its composition and TOR's.

Action: IHB

17. STATUS OF IHO PUBLICATIONS ON ECDIS

Mr HUET provided a brief description on this matter (see CHRIS/11/17A).

18. OTHER BUSINESS

Comdre. LEECH reported on the work of the Strategic Planning WG (SPWG) related to GIS applications (see CHRIS/11/18A). He emphasized that this is related to the transition of IHO and HOs into the "digital era".

Mr HECHT discussed the challenge of trying to produce both paper charts and ENCs from the same database. A Workshop hosted by BSH is planned for 15-17 February 2000 in Warnemünde, Germany on this topic. One of the objectives is to exchange experiences between industry and HOs.

Mr BERG reported on a study of the establishment of a Marine Information Database. This to be undertaken by Denmark, Norway, and Sweden. Primary focus will be on fisherman user group.

Cdr WARD advised that the Royal Australian Navy plans to install IMO-compliant ECDIS onboard approximately 80 vessels. A Request for Tender (RFT) will be issued mid-2000.

Mr CASEY indicated that the next Canadian Hydrographic Conference would be held in Montreal, Quebec, Canada during the week of 15 May 2000.

Mr SILLANARUSK informed that a Baltic RECC Meeting would be held in Tallin, Estonia on 14-15 December 1999.

Mr Van GEESBERGEN felt that there is a need for CHRIS to come up with a long-term plan (e.g. 5 years) as to where we want to go. The Chairman explained that this is part of the current SPWG process.

19. DATE AND LOCATION OF NEXT MEETING

The 12th CHRIS Meeting will take place in Valparaiso, Chile, in November 2000.

LIST OF ACRONYMS

AIS	Automated Identification System
ARCS	Admiralty Raster Chart Service (UK)
ARPA	Automatic Radar Plotting Aids
BSH	Bundesamt für Seeschifffahrt und Hydrographie (Germany)
CATZOC	Category of Zones of Confidence
CHRIS	Committee on Hydrographic Requirements for Information Systems (IHO)
C&S	Colours & Symbols
C&SMWG	Colour and Symbol Maintenance Working Group (IHO)
CD-ROM	Compact Disk - Read Only Memory
COST	Cooperation in the field of Scientific and Technical Research (European Union)
DIGEST	Digital Geographic Information Exchange Standard
DGIWG	Digital Geographic Information Working Group
DNC	Digital Nautical Chart (USA/NIMA)
DQWG	Data Quality Working Group (IHO)
EC	Electronic Chart
ECDIS	Electronic Chart Display and Information System
ECS	Electronic Chart System
ENC	Electronic Navigational Chart
ESC	Electronic Smallcraft Chart
GIS	Geographic Information System
HGMIO	Harmonizing Group on MIO's for ECDIS
HO	Hydrographic Office
IALA	International Association of Lighthouse Authorities
ICA	International Cartographic Association

IEC	International Electrotechnical Commission
IHB	International Hydrographic Bureau
IHO	International Hydrographic Organization
IMO	International Maritime Organization
ISO	International Organization for Standardization
JHD	Japan Hydrographic Department
MIO	Marine Information Object
MSC	Maritime safety Committee (IMO)
MT1	Maintenance Team 1 (IEC)
NAV	Sub-committee on Navigation (IMO)
NDI	Nautical Data International
NHS	Norwegian Hydrographic Service
NIMA	National Imagery and Mapping Agency (USA)
NOAA	National Oceanic and Atmospheric Administration (USA)
OEF	Open ECDIS Forum
PAS	Publicly Available Specifications (IEC)
PL	Presentation Library (IHO)
PRIMAR	European ENC Coordinating Centre
PS	Performance Standards for ECDIS (IMO)
QA	Quality Assurance
QC	Quality Control
RCDS	Raster Chart Display System
RECC	Regional ENC Coordinating Centre (Baltic Sea)
RENC	Regional Electronic Navigational Chart Coordinating Centre
RFT	Request for Tender

RNC	Raster Navigational Chart
RTCM	Radio Technical Committee on Maritime Services
SCAMIN	Scale Minimum
SENC	System Electronic Navigational Chart
SHARED	Singapore Hong Kong Admiralty Raster and ENC Demonstration
SHOA	Servicio Hidrográfico y Oceanográfico de la Armada (Chile)
SNPWG	Standardization of Nautical Publications Working Group (IHO)
SOLAS UN	Safety of Life at Sea Convention
SPWG	Strategic Planning Working Group (IHO)
STWC	Convention on Standards for Training and Watchkeeping
TAWG	Technology Assessment Working Group (IHO)
TDS	Test Data Set
TEN-T	Trans-European Network - Transport (European Union)
TOR	Terms of Reference
TSMAD	Transfer Standard Maintenance and Application Development Working Group (IHO)
TVO	Time Varying Object
USCG	United States Coast Guard
VPF	Vector Product Format
VTMIS	Vessel Traffic & Marine Information Service
VTIS	Vessel Traffic System
WEND	Worldwide Electronic Navigational Chart Data Base (IHO)
ZOC	Zone of Confidence

**ACTIONS ARISING FROM THE MINUTES OF THE
11th CHRIS MEETING**

Para.	Subject	Action
4	IHO-Industry Interface Workshop, March 2000.	IHB
7.1	Updating Session in conjunction with May 2000 PRIMAR Technical Experts Group Meeting.	IHB
9.1	To report to IHB on requirements for a security scheme.	Mr Mike CASEY
11	Monitoring the financial situation of the OEF and investigating alternative funding.	IHB
12.1	DQWG to become dormant.	IHB
12.3	IHB and Chairman of C&SMWG to obtain industry reaction to the PL.	IHB
12.5	SNPWG Chairmanship and Secretariat to be resolved.	IHB
16.1	To contact IEC TC80 Secretariat for the establishment of an IHO-IEC Harmonizing Group on MIOs for ECDIS.	IHB

ABRIDGED AGENDA

1. Opening and Administrative Arrangements
2. Approval of Agenda
3. Matters arising from Minutes of 10th CHRIS Meeting
4. Consideration of the Finnish Proposal to Re-arrange the Standardisation Work within CHRIS
5. Report on MSC 71 and NAV 45
 - 5.1 SOLAS Chapter V
 - 5.2 IMO Curriculum on ECDIS Training Courses for mariners
6. ECS Developments
7. Report on the ENC Updating Workshop
 - 7.1 Re-establishment of an Updating Working Group
8. Status of IEC 61174
 - 8.1 IHO ENC Test Data Set
9. Report on the 4th WEND Committee Meeting
 - 9.1 ENC/RNC Encryption and Pricing
 - 9.2 ENC Delivery and SENC Conversion
10. Projects of interest to CHRIS (e.g. SHARED or TENT-T)
11. Open ECDIS Forum
12. Reports by CHRIS Working Groups
 - 12.1 Data Quality (DQWG)
 - 12.2 Transfer Standard Maintenance and Application Development (TSMAD)
 - 12.3 Colour and Symbol Maintenance (C&SMWG)
 - 12.4 Technology Assessment (TAWG)
 - 12.5 Standardisation of Nautical Publications (SNPWG)
13. Liaison with other Groups
 - 13.1 DGIWG
 - 13.2 ISO/TC211 (Geographic Information/Geomatics)
 - 13.3 ICA Commission on Standards for the Transfer of Spatial Data
 - 13.4 IHO WG on Standards for Hydrographic Surveys (S-44) (about Standard Exchange Format for Hydrographic Data)
14. Vector Data Development
 - 14.1 European RENC (PRIMAR)
 - 14.2 ENC Development in HOs represented at the Meeting
 - 14.3 ENC Development in HOs not represented at the Meeting
 - 14.4 DNC Development in USA – National Imagery and Mapping Agency
15. Raster Data Development
 - 15.1 RNC Development in IHO Member States
16. Marine Information Objects (MIO)

- 16.1 Formalizing the relationship of MIO to CHRIS
 - 17. Status of IHO Publications on ECDIS
 - 18. Any Other Business
 - 19. Date and Location of Next Meeting
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LIST OF DOCUMENTS

CHRIS/11/1A rev.6	List of Documents
CHRIS/11/1B rev.2	List of Participants
CHRIS/11/1C rev.3	Membership List
CHRIS/11/2A rev.1	Abridged Agenda
CHRIS/11/3A	Minutes of the 10 th CHRIS Meeting
CHRIS/11/3B	Actions arising from the Minutes of the 10 th CHRIS Meeting
CHRIS/11/4A rev.1	Replies to CHRIS Letter 2/1999 "Consideration of Finnish Proposal to re-arrange the Standardization Work within CHRIS"
CHRIS/11/4B rev.1	Resumé of Responses to the Finnish Proposal
CHRIS/11/4C	Questionnaire to CHRIS Delegates on the Finnish Proposal
CHRIS/11/4D	Finnish Proposal for the Re-arrangement of the Standardization Works within the IHO CHRIS Committee
CHRIS/11/5.1A	SOLAS Chapter V – IHB CL 49/1999
CHRIS/11/6A	IHB Letter of 27/5/99 to ISO on “International Standard for Electronic Chart System Data”
CHRIS/11/6B	Diagram showing relationship between paper charts, ECDIS and ECS.
CHRIS/11/7A	IHO Workshop on ENC Updating, Mobile, Alabama
CHRIS/11/8A	Status of MT1 : Maintenance Team for IEC 61174
CHRIS/11/8.1A	Letter from Frode Klepsvik (Norway) on ENC Test Data Set and ECDIS Presentation Library
CHRIS/11/9A	Summary of the 4 th WEND Meeting, Sydney, Australia
CHRIS/11/9.1A	Raster Formats and data Encryption – IHB CL 40/1999
CHRIS/11/9.2A	Diagram on ENC Delivery and SENC Conversion
CHRIS/11/10A	3 rd SHARED Programme Meeting, Singapore
CHRIS/11/11A	Message to Open ECDIS Forum’s Board of Patrons, from Mr G. Büttgenbach, 7Cs
CHRIS/11/12.1A	Report on Data Quality Working Group (DQWG)
CHRIS/11/12.2A	Report on Transfer Standard Maintenance and Applications Development Working Group (TSMAD)
CHRIS/11/12.3A	Report on Colours & Symbols Maintenance Working Group (C&SMWG)
CHRIS/11/12.3B	Draft Proposed Terms of Reference for C&SMWG
CHRIS/11/12.3C	Existing Terms of Reference for C&SMWG
CHRIS/11/12.4A	Report on Technology Assessment Working Group (TAWG)
CHRIS/11/12.5A	Report on Standardization of Nautical Publications Working Group (SNPWG)

CHRIS/11/12.5B rev.3	Draft Proposed Terms of Reference for SNPWG
CHRIS/11/13.1A	DGIWG Liaison Report to ISO TC 211
CHRIS/11/13.2A	Liaison Report to ISO/TC211 from the IHB, to the 8 th Plenary, Kyoto, Japan, 29-30 September 1999
CHRIS/11/13.2B	Report on the 9 th Meeting of TC211, by Dr S. Kikuchi, JHD
CHRIS/11/13.2C	S-57 and DIGEST in the context of International Standards Development for Geographic Information
CHRIS/11/13.2D	Report on ISO/TC 211 Meetings in Kyoto, September 1999, by Per-A. Jakobsen, NHS
CHRIS/11/13.3A	Liaison Report on the ICA Commission on Spatial Data Standards
CHRIS/11/13.4A	Standard Exchange Format for Hydrographic Data – IHB CL 16/1999
CHRIS/11/13.4B	IHB Letter of 12/10/99 to S-44 WG Members, on Standard Exchange Format for Hydrographic Data
CHRIS/11/14.1A	Vector Data Development - European RENC (PRIMAR)
CHRIS/11/14A rev.5	Worldwide Production of Electronic Chart Data
CHRIS/11/16A	Workshop on Marine Information Objects (MIO) for ECDIS
CHRIS/11/16B	MIO Decision Tree
CHRIS/11/17A	Status of IHO Publications on ECDIS
CHRIS/11/18A	IHO Strategic Planning WG – GIS Applications of Hydrographic Data