# 6th CSPCWG MEETING
# Monaco, 01-03 December 2009

## Paper for Consideration by CSPCWG

### Report to CSPCWG6 on TSMADWG Activities

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| ***Submitted by:*** | Australia (Jeff Wootton) |
| ***Executive Summary:*** | Report on TSMADWG Activities Since CSPCWG5. |
| ***Related Documents:*** | Minutes TSMAD18 |
| ***Related Projects:*** | S-4 Maintenance |

**Introduction / Background**

The IHO Transfer Standards Maintenance and Application Development (TSMAD) Working Group is a Working Group of the IHO HSSC. Its primary objectives are to:

- Maintain the IHO Transfer Standard for Digital Hydrographic Data (S-57).
- Develop, maintain and extend the new IHO Geospatial Standard for Hydrographic Data (S-100), including management and maintenance of the IHO Hydrograhic Register, and development and maintenance of the new ENC Product Specification (S-101), including the Hydrographic Feature Catalogue.
- Monitor the development of other related international Standards.

Since CSPCWG5 and prior to drafting this report, TSMAD had held one meeting:

- TSMAD18 in Ottawa, Canada – 11-15 May 2009 (in conjunction with DIPWG1).

The main focus of this meeting was the finalisation of the new draft Standard S-100 – IHO Hydrographic Geospatial Standard for Marine Data and Information – for submission to HSSC1, and the continuation of the development of the new ENC Product Specification S-101. The following is a summary of the activities of this meeting, with particular emphasis on activities that may be of relevance to CSPCWG. Minutes of the meetings may be found on the TSMAD page of the IHO web site.

TSMAD19 will be held in Sydney, Australia, from 26-30 October 2009. The main topic for this meeting will be S-101 development. A separate verbal report on relevant discussions at this meeting will be delivered at CSPCWG6.

**Analysis / Discussion**

TSMAD18: The principle agenda item for this meeting was the completion of the draft version of S-100 so that it could be distributed to IHO Member States and stakeholders for feedback, and evaluation of the first draft of the new ENC Product Specification S-101 and discussion of any issues in this draft so far. The following issues that may be of interest to CSPCWG were discussed:

- S-100: The progress on the IHO Technical Writer version – standardised for presentation, formatting, and consistency with no change to technical content, was discussed. Subsequent to actions from TSMAD18, the final Technical Writer version was distributed for TSMAD review via TSMAD Letter 07/2009. The final TSMAD approved draft version (0.0.3) was submitted to IHO Member States and other stakeholders for feedback via IHO CL 36/2009. Stakeholder feedback was evaluated at an S-100 Focus Group meeting in the first week of September 2009, with the final result being a recommendation by TSMAD for HSSC to adopt S-100 as an active Standard from 01 January 2010. One of the major issues with S-100 is the lack of stability in ISO19117, which is the ISO Standard dealing with portrayal. The problem with ISO19117 not being stable is delaying the development of the portrayal component of S-100. The meeting agreed that the portrayal specification in S-100 should be developed in accordance with the existing published version of ISO19117, and any amendments required once this standard has stabilised can be incorporated into S-100 by extension. Note though that the current draft 0.0.3 does not contain a Portrayal component.

- TSMAD has been asked by HSSC to take a new action to investigate the possibility of incorporating S-57 dynamic tidal information in ECDIS. It is proposed that any implementation would not change the underlying data in the ENC, but rather just the display. For such implementation to work adequately, smaller interval depth areas (e.g. metre or decimetre contour interval) would be required, or alternatively an additional gridded or TIN bathymetry layer in the ECDIS may be supplied. A paper is being prepared for discussion at HSSC1 regarding TSMAD discussions to date, with the recommendation that the implementation of dynamic tidal information be deferred for a possible Product Specification within S-100. From this perspective, a paper was presented at TSMAD18 by the US regarding an S-102 Product Specification for bathymetry, and Canada presented a paper on a proposed S-10X Product Specification for high definition bathymetry utilising the Imagery and Gridded Data component of S-100, with a pilot project being developed in the St Lawrence River in Canada.
- S-57 Supplement No. 2: During the CHRIS20 meeting (November 2008), issues were raised relating to the revised testing standards for ECDIS (IEC61174), particularly in relation to new tests for the application of temporal attribution of features in the ECDIS. Additionally, an issue relating to the allocation of Zone of Confidence (ZOC) values to areas of bathymetry in ENCs, particularly values A1 and A2 in respect to the seafloor coverage component of these values, was discussed in relation to the report of the DQWG. The result of these discussions were actions on TSMAD to investigate the publication of an S-57 Supplement (Edition 3.1.2) addressing these issues. As a result of these actions, S-57 Supplement No. 2 was finalised and approved at TSMAD18, and subsequently published by IHB in June 2009 (IHO CL 32/2009 refers). While there is no impact on CSPCWG from the publication of S-57 Supplement No. 2 in regards to temporal attribution, the amendments to ZOC value components has implications in S-4 clause B-297 (Example B: Zone of Confidence Diagram). The portion of S-57 Supplement No. 2 relating to the correction to ZOC categories is included at Annex A to this report.
- ENC Encoding Bulletins: It was reported that a number of ENC Encoding Bulletins had been published since TSMAD17, and a further Encoding Bulletin was approved at the meeting. Bulletins that may be of interest to CSPCWG include:
    - EB25/FAQ25 Traffic Separation Schemes: Provides guidance on the promulgation of advance notification of changes to TSS;
    - EB26/FAQ26 Sector Lights: Provides encoding guidance for complex directional navigation lights with multiple sectors (including "oscillating" sectors);
    - EB29/FAQ30 Objects Permitted for Use in ENC and their Geometric Primitives: Advises encoders that some features that may appear on the paper chart, when encoded for ENC, will not display on the ECDIS. Some of these features will have portrayal included in S-52 Maintenance Document No. 7 (soon to be published), but the others will require alternate encoding if encoders wish these features to be displayed;
    - EB32 Wrecks: Brings the ENC encoding guidance in line with S-4 B-422 as at Edition 3.005.

  In addition to the above published Encoding Bulletins and FAQs, the following issues that may be of interest to CSPCWG were discussed:
    - Minimal Depiction Areas: Guidance in the Use of the Object Catalogue for ENC (clause 5.8.3.1) on the encoding of minimal depiction areas on ENCs where the source is the paper chart, or where larger Navigation Purpose ENC cells exist, is causing display issues for ECDIS users. This issue is a common problem that is being reported to the RENCs. It was proposed at TSMAD17 that an ENC Encoding Bulletin was required, but on presentation of the draft EB at TSMAD18, delegates considered that the guidance included in the draft would result in prohibitively increased maintenance overhead. It was determined that a FAQ only, identifying the problems that are being experienced by ECDIS users, be issued;
    - Internationally Recommended Transit Corridor (IRTC): This is a new, non-official (non-IMO) routeing measure that has been introduced in the Gulf of Aden in an effort to reduce incidences of piracy in the area. IC-ENC received an enquiry as to how this IRTC was to be depicted in ENC. Subsequent discussion resulted in an enquiry to TSMAD as to whether an Encoding Bulletin was required to provide guidance on how to encode an IRTC. TSMAD determined that at the moment this was a "one off", the limits were being amended periodically, it was not an IMO routeing measure, and had only been depicted on one special chart, therefore there was no requirement to produce an Encoding Bulletin.

- Hydro Register content: A paper was submitted to TSMAD18 by Jeppeson Marine in response to a TSMAD Letter (01/2009), which asked TSMAD members to review the S-57 Internal Extensions List for relevance to the Hydro Register. The Jeppeson paper suggested the addition of a number of new features and attribute values for inclusion in the Register. TSMAD Chair has taken an action to forward the Jeppeson paper to the CSPCWG Chair for review and comment.
- S-101 ENC Product Specification: A first draft of the document was presented to the meeting, and much of the meeting was spent discussing issues with this document. These included:
    - Tides in S-101: At this time there is insufficient experience to integrate tides in S-101, but the TSMAD Chair has taken an action to discuss tidal information integration with the Chair of the TWLWG;
    - Portrayal in S-101: Parts of S-52, in particular the Presentation Library (which will be the Portrayal Catalogue for S-101), will need to be taken from S-52. A mechanism needs to be developed to ensure that new features, attributes and enumerates proposed to the Hydro Register will also have their portrayal developed. This will need to be sorted out between TSMAD and DIPWG.
    - Magnetic variation information: Is this required in ENC? After discussion it was agreed that at the moment this information is still required. A suggestion was made that in the future magnetic variation information covering the entire world could be issued on an annual basis by WMO and used as an overlay in the ECDIS as required. This would require further investigation.
- Text placement in ECDIS: There was much discussion on this, and a paper was presented advocating the re-introduction of cartographic attributes for text placement in S-101. A discussion on this issue will be initiated on the S-101 Wiki.
- "Scale Independent Feature Layer": This concept was originally raised at TSMAD16, and was further discussed at TSMAD18. The concept relates to features that are encoded and portrayed the same regardless of the scale at which they are required – mostly point features. The suggestion is that these features only need to be encoded in a single "scaleless" ENC cell, and the relevant display scale for individual features controlled by SCAMIN (and possibly SCAMAX). All other features will be encoded on "scaleable" ENC cells (i.e. features requiring generalisation). It was decided that this concept would be included in S-101, but TSMAD stopped short of deciding to incorporate a table of "scaleless" features, leaving the decision as to which features, if any, to incorporate in a "scaleless ENC" cell.

Next Meeting: The next meeting of TSMAD (TSMAD20) is scheduled for May 2010 in Rostock, Germany in conjunction with DIPWG2.

**Conclusions**

Continued liaison between CSPCWG and TSMAD is a necessity in the ongoing review of S-4 and the development of S-100 and S-101.

**Recommendations**

- Amend S-4 B-297 (Example B) – ZOC Categories table as follows:

| ZOC | POSITION ACCURACY | DEPTH ACCURACY | SEAFLOOR COVERAGE |
|---|---|---|---|
| A1 | ±5m+5%d | =0·50m+1%d | Significant seafloor features detected |
| A2 | ±20m | =1·00m+2%d | Significant seafloor features detected |
| B | ±50m | =1·00m+2%d | Uncharted features hazardous to surface navigation are not expected but may exist |
| C | ±500m | =2·00m+5%d | Depth anomalies may be expected |
| D | Worse than ZOC C | Worse than ZOC C | Large depth anomalies may be expected |
| U | Unassessed – The quality of the bathymetric data has yet to be assessed | | |

Note that the former category MDSC was an AHO specific category that is no longer used on AU

paper charts (AU now categorises these areas as A1). It is recommended that CSPCWG approve the removal of this category.

- Support the TSMAD decision that it is not required to depict IRTC on nautical charts.

**Justification and Impacts**

No major impacts on CSPCWG projects arise from this report.

**Action required of CSPCWG**

The CSPCWG is invited to:

a. consider this report

b. determine, on the merit of the Recommendations above, appropriate action for the proposed amendment of the ZOC Diagram Key and the depiction of IRCT.

Note: Changes from S-57 Edition 3.1 are shown in red.

### 3.2 Correction to Attribute – Category of Zone of Confidence in Data

Changes made to the definitions of the attribute CATZOC

**FEATURE OBJECT ATTRIBUTES**

| Attribute: **Category of zone of confidence in data** |
|---|

Acronym: **CATZOC** Code: **72**

Attribute type: E

Expected input:

| ID | | Meaning |
|---|---|---|
| 1 | : | zone of confidence A1 |
| 2 | : | zone of confidence A2 |
| 3 | : | zone of confidence B |
| 4 | : | zone of confidence C |
| 5 | : | zone of confidence D |
| 6 | : | zone of confidence U (data not assessed) |

Definitions:

See ZOC Table on following page.

ZOC Table:

| 1 | 2 | 3 | | 4 | 5 |
|---|---|---|---|---|---|
| ZOC [1] | Position Accuracy [2] | Depth Accuracy [3] | | Seafloor Coverage | Typical Survey Characteristics [5] |
| A1 | ± 5 m + 5% depth | =0.50 + 1%d | | Full area search undertaken. Significant seafloor features detected [4] and depths measured. | Controlled, systematic survey [6] high position and depth accuracy achieved using DGPS or a minimum three high quality lines of position (LOP) and a multibeam, channel or mechanical sweep system. |
| | | Depth (m) | Accuracy (m) | | |
| | | 10<br>30<br>100<br>1000 | ± 0.6<br>± 0.8<br>± 1.5<br>± 10.5 | | |
| A2 | ± 20 m | = 1.00 + 2%d | | Full area search undertaken. Significant seafloor features detected [4] and depths measured. | Controlled, systematic survey [6] achieving position and depth accuracy less than ZOC A1 and using a modern survey echosounder[7] and a sonar or mechanical sweep system. |
| | | Depth (m) | Accuracy (m) | | |
| | | 10<br>30<br>100<br>1000 | ± 1.2<br>± 1.6<br>± 3.0<br>± 21.0 | | |
| B | ± 50 m | = 1.00 + 2%d | | Full area search not achieved; uncharted features, hazardous to surface navigation are not expected but may exist. | Controlled, systematic survey achieving similar depth but lesser position accuracies than ZOCA2, using a modern survey echosounder[5], but no sonar or mechanical sweep system. |
| | | Depth (m) | Accuracy (m) | | |
| | | 10<br>30<br>100<br>1000 | ± 1.2<br>± 1.6<br>± 3.0<br>± 21.0 | | |
| C | ± 500 m | = 2.00 + 5%d | | Full area search not achieved, depth anomalies may be expected. | Low accuracy survey or data collected on an opportunity basis such as soundings on passage. |
| | | Depth (m) | Accuracy (m) | | |
| | | 10<br>30<br>100<br>1000 | ± 2.5<br>± 3.5<br>± 7.0<br>± 52.0 | | |
| D | worse than ZOC C | Worse Than ZOC C | | Full area search not achieved, large depth anomalies may be expected. | Poor quality data or data that cannot be quality assessed due to lack of information. |
| U | Unassessed - The quality of the bathymetric data has yet to be assessed | | | | |

Remarks:

**To decide on a ZOC Category, all conditions outlined in columns 2 to 4 of the table must be met.**

Explanatory notes quoted in the table:

[1] The allocation of a ZOC indicates that particular data meets minimum criteria for position and depth accuracy and seafloor coverage defined in this Table. ZOC categories reflect a charting standard and not just a hydrographic survey standard. Depth and position accuracies specified for each ZOC category refer to the errors of the final depicted soundings and include not only survey errors but also other errors introduced in the chart production process. Data may be further qualified by Object Class 'Quality of Data' (M_QUAL) sub-attributes as follows:

a) Positional Accuracy (POSACC) and Sounding Accuracy (SOUACC) may be used to indicate that a higher position or depth accuracy has been achieved than defined in this Table (e.g. a survey where full seafloor coverage was not achieved could not be classified higher that ZOC B; however, if the position accuracy was, for instance, ± 15 metres, the sub-attribute POSACC could be used to indicate this).

b) Swept areas where the clearance depth is accurately known but the actual seabed depth is not accurately known may be accorded a 'higher' ZOC (i.e. A1 or A2) providing positional and depth accuracies of the swept depth meets the criteria in this Table. In this instance, Depth Range Value 1 (DRVAL1) may be used to specify the swept depth. The position accuracy criteria apply to the boundaries of swept areas.

c) SURSTA, SUREND and TECSOU may be used to indicate the start and end dates of the survey and the technique of sounding measurement.

[2] Position Accuracy of depicted soundings at 95% CI (2.45 sigma) with respect to the given datum. It is the cumulative error and includes survey, transformation and digitizing errors etc. Position accuracy need not be rigorously computed for ZOCs B, C and D but may be estimated based on type of equipment, calibration regime, historical accuracy etc.

[3] Depth accuracy of depicted soundings = a + (b*d)/100 at 95% CI (2.00 sigma), where d = depth in metres at the critical depth. Depth accuracy need not be rigorously computed for ZOCs B, C and D but may be estimated based on type of equipment, calibration regime, historical accuracy etc.

[4] Significant seafloor features are defined as those rising above depicted depths by more than:

| | Depth | Significant Feature |
|---|---|---|
| a. | <40 m | 2 m |
| b. | >40 m | 10% depth |

A full seafloor search indicates that a systematic survey was conducted using detection systems, depth measurement systems, procedures, and trained personnel designed to detect and measure depths on significant seafloor features. Significant features are included on the chart as scale allows. It is impossible to guarantee that no significant feature could remain undetected, and significant features may have become present in the area since the time of the survey.

[5] Typical Survey Characteristics - These descriptions should be seen as indicative examples only.

[6] Controlled, systematic surveys (ZOC A1, A2 and B) - surveys comprising planned survey lines, on a geodetic datum that can be transformed to WGS 84.

[7] Modern survey echosounder - a high precision single beam depth measuring equipment, generally including all survey echosounders designed post 1970." (See also 1.Cl.42).