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**REPORTS ON THE WORK OF THE IHO
FOR THE PERIOD
2007 - 2011**

**Addendum 1 to
WORK PROGRAMME No. 3
INTER REGIONAL COORDINATION
AND SUPPORT**

**IRCC REPORT ON DEVELOPING IHO PUBLICATION C-55,
STATUS OF HYDROGRAPHIC SURVEYING AND NAUTICAL CHARTING WORLDWIDE**

IRCC REPORT ON DEVELOPING IHO PUBLICATION C-55, STATUS OF HYDROGRAPHIC SURVEYING AND NAUTICAL CHARTING WORLDWIDE

(Final - 10 March 2012)

1. Background

At its 3rd meeting (IRCC3), the IRCC Committee agreed Action 09 - "Conduct a meeting to design a framework for C-55 development" as a result of a paper presented for consideration to IRCC3 by the Baltic Sea Hydrographic Commission (BSHC). The paper (attached to IRCC3-03.1F) was entitled "Baltic Sea Hydrographic Commission Approach for Coordinating Hydrographic Surveys on the Baltic Sea and for Displaying Survey Status".

The IRCC members agreed that extending such a database worldwide would improve the current C-55 publication, and UKHO was tasked to organise a meeting of the CBSC, RSAHC, SAIHC, EAHC, MBSHC, MACHC, NIOHC, SWPHC and BSHC and report to IRCC Chair by 31 July 2011.

The CBSC Chair thought there was some value in developing certain themes before arranging a meeting in order to stimulate discussion. Consequently UKHO and the CBSC Chair conducted some preparatory scoping work by correspondence with significant input from the Finnish Transport Agency Hydrographic Office.

In parallel, the IHB submitted for consideration by the 18th International Hydrographic Conference (IHC) proposal - PRO 6 - about the global status of hydrographic surveying. This proposal invites the Conference to "task the IRCC and HSSC in cooperation with the Directing Committee to progress whatever actions are required to improve the collection, quality and availability of hydrographic data worldwide, monitor and rectify possible deficiencies and shortcomings, cooperate with other international organizations and stakeholders as necessary, and to keep Member States informed on progress on this issue."

This document reports on the outcome of the preliminary work of IRCC, supplemented with input from the IHB Directing Committee, and offers recommendations for the way forward to be considered by the 18th International Hydrographic Conference when discussing PRO 6 and the IHO 2013-2017 Work Programme.

IRCC is aware that the information in this document is not complete and that the issues are not yet thoroughly analysed. This document is meant to foster open discussions.

2. Analysis

2.1. Current IHO C-55

2.1.1. In accordance with IHO Resolution 1/2010, the aim of the IHO Publication "Status of Hydrographic Surveying and Nautical Charting Worldwide, C-55" is to present a clear picture of the worldwide coverage of surveys and nautical charts and of the extent of effective organisations for the timely promulgation of navigational safety information. The content of the reports is now held in a live database on the IHO web site from which up to date reports can be extracted at any time. The database covers the waters of 90% of the coastal states of the world.

2.1.2. The third edition of C-55 is now a web based database solution. It is planned to be updated by the HOs to send updated information to the IHB by e-mail or fax. Outputs are different reports and summary reports from the database.

2.1.3. The C-55 contains very limited and overview information on the following issues:

- Status of hydrographic surveying (percentages for two depth ranges),
- Status of nautical charting (percentages for INT, RNC and ENC coverages for three scale ranges),
- Status of Maritime Safety Information (YES/NO information).

2.1.4. The current C-55 has some drawbacks or weaknesses such as:

- The information is very high level status information,
- The grouping of data is useless for many purposes (e.g. < 200m / > 200m),
- The updating procedures need involvement and work of the IHB staff,
- The information in the current C-55 has little direct benefits to the HOs and thus some HOs are not motivated to update their information,
- It does not cover all areas used for navigations, e.g. inland lakes,
- It does not support all kind of status to be included, e.g. re-survey frequency,
- It does not support modern GIS tools and has very limited capabilities of spatial analysis.

2.2. **Actions and proposals** related to the development of C-55 and other metadata services

2.2.1. The BSHC proposed to the IRCC3 meeting in May 2011 the Baltic Sea Re-survey Scheme and Re-survey Database as an example of a regional implementation for presenting survey status and plans. The BSHC also proposed that the future C-55 should include more information than only the status of hydrographic surveys, e.g. status of nautical charting.

2.2.2. The Baltic Sea INT Charting Group (BSICCWG) had its first meeting in June 2011. At that meeting the IHB presented a draft database solution for establishing a database to replace the existing Catalogue of INT Charts, S-11 Part B. During this demonstration some problems with the integrity of the current data were identified. The BSICCWG welcomed the demonstration, endorsed the further development plans and volunteered to use the Baltic Sea INT Scheme as a Pilot area of the new database. However there have not been any actions on this issue since June 2011.

2.2.3. The WEND-WG1 meeting in October 2011 had at least two documents related to the metadata. In *WEND-WG1-03* the IHB presented some possible ways to present and forward ENC metadata. The meeting agreed the paper in principle; however there were some concerns over resourcing, upkeep and updating. In *WEND-WG-10* (Chapter Metadata) the BSHC re-iterated its proposals for the development of C-55 as presented at the IRCC3.

2.2.4. The Hydrographic Commission of Antarctica (HCA) had its 11th meeting in October 2011. There the IHB presented a demonstration of the Antarctic GIS which has been developed at the request of HCA (ref. HCA11-07.4B). The GIS is based on a S-100 compatible metadata database and a web map server; it includes many kinds of metadata which can be browsed and displayed by Google Earth browser. The solution is intended to be usable on a global basis, ideally under the stewardship of each Regional Hydrographic Commission (RHC).

2.2.5. The BSHC is in the process of updating the limits and names of the subareas of the Baltic Sea, S-23 Chapter 2 Baltic Sea. During this process it has been found that the existing format of S-23 (1953 edition) is old-dated and does not support efficiently the modern digital needs. There are some proposals to enhance the format, e.g. to be able to store the limits as geometry features. In addition, the S-23 can also be regarded as metadata and to be included into the future C-55 database. It is not known how

extensively the S-23 will be used as a printed document¹, if the information is available in digital form in a database. If needed, a printed S-23 can be printed from the database.

2.2.6. At the NSHC Re-survey WG meeting on 28-29 November 2011 (with the participation of a representative of the BSHC Re-survey MWG) there were some discussions on the framework of C-55. The discussions dealt mainly with issues related to showing the status of surveys. It was noted that there may be different capabilities in different regions. The solutions should be kept quite simple. There are already possibilities to exchange e.g. shape files. IHO DQWG should be connected. Data models should be harmonised and duplicate datasets should be avoided.

2.2.7. At the HSSC CSPCWG meeting (29 November – 2 December 2011) the demonstrations and plans of the Antarctic GIS and the S-11 database were presented and welcomed by the meeting.

2.2.8. Under task 1.2.3 in the IHO Work Programme 2012 (IHO Publications - production, editing) the IHB is developing a semi-automated capability to support various IHO publications. In parallel to the development of the Antarctica/Regional GIS, the IHB is working on a “country” database. This database will, in the first instance, contain all relevant details of States that may be required as references by the IHO and the IHB. So, for example, all the information currently lodged in IHO Publication P-5 (Yearbook) will be accessible via this database and it is envisaged that the Yearbook will be generated directly as a report from the database. This is similar to how IHO Publication S-62 (List of Data Producer Codes) is already maintained and generated. The Antarctic GIS is expected to be available by the end of 2012 and a global version available one year later. The country database is expected to be available towards the end of 2012. It is envisaged that information in the two databases will be linked and accessible, such that the current requirements of C-55 can be met via a digital data environment. This will include the ability to import and export the data for manipulation by GIS tools as required and input/output access via a data portal.

2.2.9. As a summary to the issues listed in the previous paragraphs it can be noted that the IHO has many kinds of metadata. Some of these are already in digital form, but many of them are still in text format in printed documents. Some of these are listed in the table below.

Dataset	Metadata	Format	Comments
C-55	Status of hydrographic surveys, nautical charting and MSI	database	- limited information, - not very useful format
S-11 Part B	INT Chart Catalogue	text document	- laborious to update, - difficult to use
IHB, RENCs	ENC metadata	digital	- natural function to RENCs
S-23	limits and names of sea areas	text document	- old-dated format, - difficult to use
HOs	Chart catalogues	text (?) documents	- national chart catalogues - lists of backup charts
BSHC	Re-survey metadata	database	- goal to cover the whole Baltic Sea area - available via web.

¹ Subject to the orientations for the future of this publication which are considered separately. Only the “container” aspects are considered here.

Dataset	Metadata	Format	Comments
Others	Tide gauges, undersea features, etc.		

Ongoing developments at the IHB should provide the tools for managing and displaying these metadata and should constitute the foundation of a single project for a database based IHO Metadata Service including harmonized specifications (to be agreed by IHO MS), development, concept of operations / maintenance of database (ensuring interoperability and sustainability in the long term), interfaces with other initiatives (e.g.: Inspire, etc.).

2.2.10. The benefits of a database based IHO Metadata Service are quite obvious and go well beyond simply replicating current publications. Some of them are listed below:

- Increases the integrity and quality of metadata (database integrity checks).
- Allows more easy population, browsing, downloading and updating the metadata.
- Reduces the workload of the IHB staff (when updating done by HOs or RHCs).
- May replace some current IHO printed Publications (e.g. P-5, S-11 Part B, S-23, S-62). These can be printed directly from the database when needed.
- Modernises IHO metadata management.
- Supports modern GIS applications and analysis.
- Supports IHO capacity building.
- The HOs are likely to populate and update their information if they also have direct benefits of the service.

2.2.11. The technological aspects of developing an IHO Metadata Service seem to be properly harnessed through ongoing development at the IHB. However the creation of digital databases, while offering much greater efficiencies, will not overcome the major weakness that is a lack of reliable and relevant data. The issue of how the appropriate information can be collected and maintained in the long run on a global basis is probably the most critical aspect.

3. Way forward

3.1 Based on the consideration above, a task dealing with the enhancement of C-55 has been proposed in the draft IHO 2013-2017 Work Programme under IHB leadership (ref. CONF.18/REP/01, task 3.4.3: enhance publication C-55).

3.2. As a first step it is recommended to develop a framework for an IHO Metadata Service, including all ongoing actions and metadata, not only limited to that currently in C-55. It is important to have overview specifications for all metadata, even if some parts will be implemented in later phases.

3.3. The total framework should be defined at least in principal levels before some details of them will be implemented so that the various parts can be implemented in different phases but in a harmonised way to avoid any mismatch between them.

3.4. A Work Plan for developing the framework should be established.

3.5. The following issues should be considered and included into the Work Plan to develop the framework:

- Clarify the expected use (e.g. for capacity building, re-survey schemes and priorities, etc.) and users (e.g. IHB, HOs, IMO, other organisations) of the metadata,
- Identify which IHO Publications would benefit from a metadata based service,
- Define the data contents of the metadata (e.g. time dimension, additional information such as survey plans, etc.),
- Define in which way the metadata will be organised and grouped (e.g. for safety of navigation / for other purposes),
- Specify the joint data model for metadata sets, based on S-100 and relevant SDI standards,
- Specify the operational principles of the metadata base (e.g. frequency of updating; on-line updating by authorized database operators, browsing by all; interoperability with other systems, etc.),
- Evaluate ongoing technical developments,
- Evaluate technical and other resources needed at the IHB, RHCs, ICCWGs and HOs, taking into consideration the impact on the maintenance of existing IHO Publications and the possibility to resort to contracted support,
- Identify and address difficulties in obtaining and maintaining up to date, reliable and relevant data both at the national and regional level,
- Propose ways to deal with those countries not able to upload and / or update their information in the database,
- Analysis of impacts,
- Financial considerations.

3.6. Many IHO bodies should be involved in the work to define the framework, e.g. the IHB, RHCs, IRCC, HSSC, DQWG, DCDB. A project group should be formed to assist the IHB and ensure coordination with all the bodies concerned.

3.7. IRCC recommends that:

- (i) the IHB take the opportunity of the 18th IHC to brief MS on the progress made so far;
- (ii) the Conference consider the principles of developing a IHO Metadata Service project when discussing PRO 6 and the IHO 2013-2017 Work Programme;
- (iii) the IHB arrange a side-meeting of the interested parties to consider in more details the Work Plan and the organization of the project if the principles are agreed by the Conference.