

Paper for Consideration by Nautical Cartography Working Group

Report from Data Quality Working Group

Submitted by:	DQWG Chair
Executive Summary:	NCWG is invited to actively participate in the testing and implementation of the Visualization of Quality of Bathymetric Data.
Related Documents:	List of Decision and Actions arising from HSSC-11, HSSC11-05.5B, HSSC-7 Final Minutes, SOLAS Chapter V - 1/7/02, S100WG TSM7-7.8
Related Projects:	S-101 Product Specification and Data Classification and Encoding Guide

Introduction / Background

DQWG has been tasked by HSSC to develop a methodology to visualize the quality of bathymetric data. DQWG has proposed a new methodology at HSSC11. HSSC11 commended the DQWG for the work carried out on the development of the conditional visualization methodology of quality of bathymetric data and encouraged this development to be pursued in liaison with S-100WG Chair, NCWG, NIPWG, ENCWG, S-101PT, involving if possible academia, training centres, expert contributors and industry partners (for testing and implementation experimentations).

Analysis/Discussion

The SOLAS (Safety of Life at Sea) Convention is published by the IMO (International Maritime Organisation). SOLAS Chapter V refers to the Safety of Navigation for all vessels at sea.

Regulation 34 - safe navigation and avoidance of dangerous situations states:

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- 1) Prior to proceeding to sea, the master shall ensure that the intended voyage has been planned using the appropriate nautical charts and nautical publications for the area concerned, taking into account the guidelines and recommendations developed by the Organization.

 - 2) The voyage plan shall identify a route which:
 - .1 takes into account any relevant ships' routing systems;
 - .2 ensures sufficient sea room for the safe passage of the ship throughout the voyage;
 - .3 anticipates all known navigational hazards and adverse weather conditions; and
 - .4 takes into account the marine environmental protection measures that apply, and avoids as far as possible actions and activities which could cause damage to the environment.

 - 3) The owner, the charterer, or the company, as defined in regulation IX/1, operating the ship or any other person, shall not prevent or restrict the master of the ship from taking or executing any decision which, in the master's professional judgement, is necessary for safe navigation and protection of the marine environment.
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The methodology to visualize the quality of bathymetric data as proposed in paper HSSC11-05.5B can strongly support article 2.2 and 2.3 to ensure sufficient sea room for safe passage of the ship throughout the voyage. It may also support article 3 to support the master's professional judgement for taking and executing any decision necessary for safe navigation and protection of the marine environment.

When planning the voyage a computer algorithm can check if the waypoints entered by the Mariner and/or the legs between the waypoints intersect with the minimal safe distance to ensure sufficient room from isolated objects hazardous to navigation. In planning mode a visual and/or audible alarm should be triggered to notify the Mariner of

this risk. DQWG recommended that in planning mode a message is displayed, that a planned route will not be saved automatically if the SAFETY ZONE for the intended route contains any dangers to the vessel, unless over-ridden by the Mariner. In planning mode, a “show detail” option is to be developed, providing detailed information along the route where the SAFETY ZONE is breached. Then the Mariner can make a decision if he feels the risk is acceptable or not.

During execution of the voyage, the “standard” ECDIS portrayal should be active. When the safety zone is breached, DQWG suggests that a text alert appears on screen:

SAFETY ZONE ALERT
show details

When the Mariner activates “show details” an overlay is activated, portraying the circle(s) of uncertainty around the object(s) or sounding(s) that cause the alert. The Mariner instantly sees that at present course and speed he will enter an area where there is a possible danger. This will allow the Mariner to make a well informed decision and stay clear of the hazardous object.

At HSSC7 a proposal was made for addressing portrayal issues (HSSC7 Final Minutes, page 8). According to that diagram, DQWG provides the following information:

- PS S-101 and S-101 Data Classification and Encoding Guide
- ECDIS system
- Overlay functionality
- Temporary (as the situation occurs)
- Global use
- First portrayal ideas: text message, then supported by circles, dashed in magenta, line width 0.6 mm

S-100WG and NIWC have both indicated at TSM7 that drawing circles in interoperability mode is technically challenging within the LUA scripts. Therefore an overlay functionality should be easier to generate and easy to understand. This has been demonstrated in presentation TSM7-7.8 The Mariner should have a simple ON/OFF button to manually activate or de-activate the portrayal of Quality of Bathymetric Data. When the situation occurs that the Mariner should be alerted, the system should automatically activate by showing an alert and when showing details, the overlay is activated. The Mariner can, after inspection of the risk, manually de-activate the portrayal mechanism. If the risk to safety of navigation disappears, the overlay should be automatically de-activated if it has not been done manually already.

Investigation of previous shipping accidents show that the type of groundings that can be prevented occurred in areas of lower quality (CATZOC C, D or U) with ships passing less than 500 meters from isolated underwater objects with unknown and/or inaccurate depths.

Conclusions

The methodology proposed will help to keep vessels clear of dangerous situations with a grounding risk. A more autonomous vessel can automatically deviate from the risk ahead or reduce speed if deviation is not possible.

Recommendations

Portraying Quality of Bathymetric Data should have a simple ON/OFF switch.

Portraying Quality of Bathymetric Data should be automatically activated when the SAFETY ZONE of the vessel is breached, both in planning and execution of the voyage.

Overlay should automatically de-activate if the risk to safety of navigation is no longer valid.

Justification and Impacts

The proposed methodology may prevent future shipping accidents, loss of life at sea and damage to the environment. It may also facilitate and accelerate the development of autonomous shipping.

Action Required of Nautical Cartography Working Group

The NCWG is invited to:

- a. note this report;
- b. note report HSSC11-05.5B;
- c. note presentation TSM7-7.8;
- d. discuss the recommendations;
- e. liaise with other HSSC WGs as deemed appropriate;
- f. take any other action as deemed appropriate.