Paper for Consideration by HSCC

Report on the application of some ISO 9001 Principles in the development of S-101 PS

Submitted by:	HSSC ISO 9001 Cell
Executive Summary:	This paper presents the work done by the HSSC ISO 9001 Cell and some recommendations are proposed to carry on the experiment of applying ISO 9001 for process management.
Related Documents:	1/ S-101 Detailed GANTT, v10 April 2023 (.xls) 2/ Risks and Opportunities Management, 03/02/2023 (.doc)
Appendices	1- Minutes of meeting on GI Registry resilience - contribution to the action HSSC14/18 – Monaco 2 September 2022
Related Projects:	HSCC; S-100; S-101; DQWG.

Principal Activities and achievements

Regular VTC meetings have been held with an active participation of S-101 PT Chair, S-101 Vice Chair, acting as S-101 PCO[1] and HSSC vice chair, acting as HSSC PCO of the activities related to the application of ISO 9001 principles (27/02/2022, 03/02/2023, meeting planned 27/04/2023).

The GANTT diagram and Risks and Opportunities Management Purposes document are maintained by the S-101 PCO. Meetings enable discussions and agreement on planning, risk assessment and mitigation.

Action HSSC14/18 "*HSSC noted the concerns raised by the HSSC ISO 9001 Cell on the resilience of the IHO GI Registry… and invited the IHO Secretariat in liaison with KHOA and the HSSC ISO 9001 Cell, to consider the recommendations provided in Appendix 2 of Doc. HSSC14-05.5B for a reliable and more robust situation in the long term.*" is completed.
A meeting has been held in Monaco on Friday 2 September with the IHO Secretariat. The minutes (Appendix 1) includes recommendations for improving the resilience of the IHO GI Registry. These recommendations might be considered for the establishment of a structure for the management of the framework for S-100 in the long term.

Action HSSC 14/63 *"HSSC noted the outcome of the objective analysis made by the **HSSC ISO 9001 Cell** on the development of Ed. 2.0.0 of S-101 and agreed on the recommendations to monitor the progress on the Portrayal Catalogue."*
Significant progress has been made with the achievement of the following milestones, thanks to the meaningful contribution of US NIWC :

- S-101 Portrayal Catalogue version 1.0.2 published - November 2022;
- S-101 Portrayal Catalogue 1.1.0 published in GI Registry – March 2023.

The Portrayal Catalogue is no longer on the critical path of the development of S-101 PS, so the action may be considered completed.
The critical path to get S-101 Edition 2.0.0 according to the agreed timetable is now highly depending on the capacity to test S-101 in an ECDIS S-100, the maturity of S-98 and S-164 are key dependencies for meaningful testing.

Analysis/Discussion

From the Risks and Opportunities analyze (refer to related document 2), the report focuses on the most "critical" risks (evaluation = high) for which it is therefore necessary to plan actions to mitigate it.

[1] Project Control Officer

1- Lack of resources is highlighted each year, active contributions from Members States and additive funding will be necessary to meet the targets set out in the S-100 Roadmap.

In order to provide insights on how much work is funded now either via IHO or others and how it will require to achieve the development of Edition 2.0.0 of S-101 PS for 2026 comparing with the currently funding, ISO Cell proposes to collect these data in order to have a precise view of the situation and to better manage priorities, with some anticipation. This "Effort KPI" can be a second KPI of S-101 PS process (the first one being the Progress on milestones from S-101 Ed 1.0.0 to Ed 2.0.0 measured through the GANTT diagram).

2- Insufficient time to test Dual Fuel concept in S-100 ECDIS prototypes

Testing DF concept requires:

- S-101 tests data sets compliant with S-164 PS;
- S-100 ECDIS prototypes;
- Testbed environment.

According to the current S-101 PS development timetable, these tests should start by June 2023. DF-ECDIS prototypes started to emerge and are participating in several testbed project : NIWC S-100 Test Bed Project, KHOA-NOAA S-100 Testbed project, "S-100 across the Channel – from St-Malo to Southampton" by UKHO and Shom, the IHO Singapore-lab project "S-100 ECDIS capable of displaying S-102 with S-101", … All these initiatives are very important and will contribute to provide feedback and improve the quality of PS.

Reducing that risk imply here again allocating resources to develop DF-S100 ECDIS able to ingest and manage S-57 and S-101 ENC. Testing and developing the PS need an agile approach with effective feedback loops to support testing and ensure feedback is actioned and traceable. The expanded use of Git should help to track and manage the different versions of PS, efficiently.

As testbed activity is going to increase, the results of the various projects would benefit from being centralized and accessible from a page on the IHO website. The "S-100Ressources" webpage should be the focal point (https://iho-ohi.github.io/S100Resources/).
Currently, a webpage named "TEST BED" of the IHO Geospatial Information Registry contains the links to the PS (different tools are accessible from the webpage Help&Guidance/Repository). Another webpage (https://iho.int/fr/ressources) gives a link to a BaseCamp/TestBed, defined as "*Place to be discussed the results of S-100WG TestBed activities and shared related tools*", but it seems that the BaseCamp is now closed.

3- Insufficient time to test S-98 interoperability in S-100 ECDIS prototypes

Testing interoperability requires the availability of :

- S-98 and S-164 PS,
- S-101 tests data sets,
- S-102, S-104, S-111 and S-124 tests data sets (corresponding to the first step : products for the route monitoring mode).

The timely availability of these data is a major challenge, and some of them are now on the critical path (see the report from S100WG).
Can we achieve S-101 Edition 2.0.0 without testing level 1 and 2 of interoperability? If not, it becomes necessary to clearly define and take into account the interdependencies between PS, in the S-101 development timetable.

There are two solutions to mitigate the risk not meeting deadlines :

- increase resources,
- specify the exact needs without over-specification, especially for S-98. One of the major issues is to be sure that the mariner will understand how interoperability works and what the system displays. The present version of S-98 is a highly technical document, necessary for the implementation of interoperability rules (system centric). A mariner centric approach, with comprehensible use cases, might be considered. This could lead to simplifications, considering only what seafarers find useful.

These 2 risks highlight the interdependencies between the Product Specifications, while they are all in the development and testing stages. Taking these dependencies into account is essential to ensure that milestones are achieved.

Action Required of HSCC

The HSCC is invited to:

a. **Note** this paper.

b. Given the dependency on others PS development timeline to validate S-101 PS edition 2.0.0 after a testing period, **Consider** the principle to expand the scope of the ISO Cell to S-164 and S-98 developments and designate a PCO from the S-164/S-98 subWG to join the ISO Cell and participate to maintain Gantt diagram and risk management documents.

c. **Consider** the monitoring of a "Effort KPI" as a new KPI for the S-101 PS process (the first one being the Progress on milestones from S-101 Ed 1.0.0 to Ed 2.0.0 measured through the GANTT diagram)

d. **Consider** the need to ensure traceability of tools, documentation and feedback from testbed activity and make it easily accessible from a unique landing page: the "S-100Ressources" webpage (https://iho-ohi.github.io/S100Resources/) ;

e. **Initiate** any further actions as considered necessary.

Appendix 1 - Minutes of meeting held on 2 September 2022 at IHO Secretariat (Monaco)

Participants : Abri Kampfer (Director), Yves Guillam (Assistant Director), Yong Baek (Assistant Director), Jeff Wooton (Technical Standards Support Officier and GI Registry Manager), Nathalie Leidinger (vice-chair of HSSC, ISO 9001 Cell PCO)

Subject : GI Registry resilience - contribution to the action HSSC14/18

HSSC *noted the concerns raised by the HSSC ISO 9001 Cell on the resilience of the IHO GI Registry… and invited the* ***IHO Secretariat*** *in liaison with* ***KHOA*** *and the* ***HSSC ISO 9001 Cell****, to consider the recommendations provided in Appendix 2 of Doc. HSSC14-05.5B for a reliable and more robust situation in the long term.*
HSSC Chair to mention this resilience issue in the report to C-6 and the proposed way forward.

Related documents :

a) MOU (28/02/2018) : Arrangement between the International Hydrographic Organization and the Korea Hydrographic and Oceanographic Agency on Technical Cooperation regarding the IHO Service System - https://bit.ly/3TLgY5l
b) S-99 Operational Procedures for the Organization and Management of the IHO Geospatial Information Registry, there is quite nothing - https://bit.ly/3AQxcBu
c) HSSC 14-05.5B : Report on the application of some ISO 9001 Principles in the development of S-101 PS - https://bit.ly/3KV1Myv
d) S-100 Work Plan, List of decisions & actions arising from S-100WG - https://bit.ly/3RH9GxK

Appendix : maturity level assessment of the process "Development and maintenance of the IHO GI Registry"

IHO GI Registry is a core component of S-100 world. Without this infra system, it was recognized that S-100 based Product Specifications (PS) could not be developed and maintained in a harmonious manner. IHO GI Registry is part of the critical framework needed for usage of S-100 products in future S-100 ECDIS (see Report of HSSC 14 to C-6).

According to the provisional timeline S-100 PS for the route monitoring mode will be operational and S-100 ECDIS will be legal to use after 1 January 2026.

In conjunction with these significant milestones, a key issue is to have an effective, useful, safe, and secure GI Registry system for the operational phase and to maintain it in the long term.

The first recommendation provided by the ISO 9001 Cell to increase the resilience of the IHO GI Registry was to carry out an audit, in order to have a global view of the shortfalls and difficulties. During the meeting, an assessment of the maturity level of the process "Development and maintenance of the GI Registry" has been done, using CMMI (Capability Maturity Model Integration) model, CMMI being focused on process improvement. The result is shown in the appendix.
The level 2 (the process is planned, documented, performed, monitored and controlled at the project level, often reactive) is reached. To be noted, the high level of expertise and skills in the teams (IHO sec. & KHOA) is a key factor today, to maintain. Some actions are needed to be undertaken to strengthen the upper levels, in particular level 3 (effectiveness) and 4 (risks and opportunities management). They are part of the following recommendations agreed upon.
1/ The development, maintenance and hosting of the GI Registry system rely on KHOA. Relationships between IHO and KHOA are governed by a MOU (*Ref a*) signed in 2018. It's a general document, which should be expanded for this critical component on the following points related to the GI Registry : expected results (service level agreement), means (organizational, human resources, IT, budget), communication, reversibility arrangements in case of MOU cancellation, …
Recommended action : formalize in a specific annex to the general MOU, the respective obligations of parties as regards the GI Registry. @ for consideration IHO Secretariat and KHOA.

2/ The development and maintenance of the GI Registry is effective, thanks to a high level of involvement and expertise at IHO Secretariat and KHOA. Residual bugs are resolved in a reactive way. Issues and improvements (scheduled for a next build) are recorded in a dedicated IHO Gitlab repository. New developments or important actions are decided under the remit of S-100WG and recorded in the Work Plan and list of decisions and actions. Then, they are carried out by KHOA in close cooperation with the Secretariat. Design, development, testing and deployment are mostly monitored in an informal way (exchange by e-mail / phone) between KHOA and the

Secretariat. From concerns raised (ref c), PS developers require co-design of new functionalities involving end-users and the need to clearly define and test changes before implementing. However, IHO Secretariat regrets the lack of involvement and inputs from MS representatives, in the GI Registry project.
Recommended action : set up and formalize the GI Registry Project Team, subsidiary of the S-100WG dedicated to the development and maintenance of the GI Registry and make it active. Record and publicize the activity among WG and Domain Control Body when it is relevant in order to trigger a wider interest in the GI Registry. @ for consideration of S-100WG.

3/ GI Registry is multi-domain, which is unique and make management more complex. The Registry management is described in S-99 (ref b). The Registry Manager makes sure that new proposals are complete and comply with the requirements, then Domain Control Body (DCB) representatives (WMO, IALA, IEC, IHO, HD, TWCWG, IEHG, UKCM) have to assess the proposal within 60 days. In fact, only few are doing the evaluation, which leads to delay and additional costs. From HSSC 14, NIPWG Report : The S-124 submissions has experienced several weeks of delay due to some DCB members not having submitted their approval or comments to the submissions. The functionality of overriding DCB approval at the end of the period was untested and unavailable. After 110 days, the Registry Manager, assisted by the Registry development team of KHOA, processed the submissions.

A Guidance documentation to assist Submitting Organization and DCB representatives is currently being written (Future Annex of S-99) and a workshop is planned for December 2022.
According to S-99, *the Executive Control Body (ECB) monitors and advises the Register Manager(s) and acts as arbiter for any decisions or disputes in the Registry process.* In practice, no appeals have yet been made and an ECB doesn't formally exist.
Recommended action : organize regular meeting of DCB representatives and report in order to create a dynamic within this group, make their role visible and promote it, listen to their needs (training, documentation, …). Establish the ECB as the IHO Secretariat. @ for consideration IHO Secretariat/Registry Manager.

4/ The components of GI Registry are described in a technical way. The fact that it highly contributes to the creation of value for IHO, Member States and various stakeholders is insufficiently promoted.
Recommended action : develop communication (including at strategic level) & training tools ("GI Registry for Dummies", "Quick start for GI Registry", …). It will contribute to the necessary collective awareness of the importance of this tool. @ for consideration IHO Secretariat (subcontracting to be considered).