

**2nd S-100 Working Group (S-100WG) Meeting
Genoa, Italy (15 - 18 March 2017)**



Minutes

Chair: Julia Powell (USA - NOAA)

Vice Chair: Yong Baek (Rep of Korea – KHOA)

Secretary: Anthony Pharaoh (IHO Secretariat)

Annexes:

Annex A - Actions

Annex B – Agenda

Annex C – List of Participants

Annex D – Record of S-102PT Break-out Sessions, including decisions and actions.

Action numbers are listed against each agenda item in these Minutes. Refer to Annex A for the list of actions. S-102PT actions are listed at Annex D.

WG Member abbreviations:

AB Andre Bolles (IALA)
AM Arno Meurink (NL)
CdM César Reinert Bulhões de Morais (BR)
CM Christian Mouden (FR)
CT Cristina Tirone (IT)
DB Dave Brazier (US)
DG Darja Günter (EE)
EK Ed Kuwalek (IIC)
FM Flávia Mandarino (BR)
FMK Friedhelm Moggert-Kaegeler (SevenCs)
GT Guttorm Tomren (IALA)
HA Hugh Astle (CARIS)
HB Holger Bothien (SevenCs)
HP Hannu Peiponen (Furuno)
JL Junshik Lee (RoK – KHOA)
JLP Julia Powell (US, S-100WG Chair)
JP Jonathon Pritchard (UK)
JW Jeff Wootton (IHO Sec.)
KI Konstantin Ivanov (Transas)
LH Liz Hahessy (IC-ENC)
LS Ludovico Sturla (IT)
MB Megan Bartlett (US)
MH Mikko Hovi (FI)
MS Mikan Stamenkovich (US – SPAWAR)
NL Nick Lemon (AU – AMSA)
OF Odd Aage Føre (NO)
PP Patti Parkhouse (CA)
RF Richard Fowle (DK)
SO Sewoong Oh (RoK – KRISO)
SS Svein Skjaeveland (PRIMAR)
TP Tony Pharaoh (IHO Sec.)
YB Yon Baek (RoK – KHOA)

1. Opening and Administrative Arrangements

The Chair Julia Powell welcomed all members to the meeting, and noted that she was pleased to see the very good representation from both Member States and industry stakeholders. She invited the Director of the Italian Hydrographic Institute to address the meeting.

Director Luigi Sinapi, welcomed the WG members to Genoa, Italy. He stressed the importance of work being undertaken by the S-100WG and the valuable contribution the development work was making towards enabling the IHO to achieve its Strategic Objectives. He invited members to take advantage of their time in Genoa to see some of the beautiful landmarks and historical heritage of the port city. He wished the meeting every success for their work activities.

1.1 List of Documents

The list of documents was reviewed and approved.

1.2 List of Participants

The list of participants is included at Annex A.

2. Approval of Joint Agenda

The agenda was unanimously approved by the meeting. The Chair announced that items 5 and 6 would be taken at the end of the meeting.

3. Matters Arising

3.1 Minutes of S100WG1 and TSM4

The S-100WG1 minutes were reviewed, and approved by the meeting.

3.2 Status of Actions from S100WG1 and TSM4

The meeting reviewed the progress of actions from the S-100WG1 meeting.

4. Matters Arising from HSSC-8 (Monaco) and IHA1 (Assembly)

4.1 HSSC Actions for S100WG

This Chair reviewed the list of actions from the HSSC8 meeting:

- HSSC8/11 – action completed. WG members were requested to ask their offices to vote / respond to CL 15/2017 dated 10 Feb.
- HSSC8/12 – Promote the operation of the registry – ongoing.
- HSSC8/13 – to be discussed under paper S-100WG2-8.5A.
- HSSC8/14 – to be discussed under paper S-100WG2-10.2.
- HSSC8/16 – S-121 Project Team (Maritime Limits and Boundaries) ongoing.
- HSSC8/18 - Resource Description Framework (RDF) – Done (see paper S-100WG2-9.3B).
- HSSC8/19 - there is no need to consider proposing amendments to the IMO Performance Standards – ongoing.

- HSSC8/20 - IMO/IHO Harmonization Group on Data Modelling (HGDM) – see paper S-100WG2-6.8. Ongoing.
- HSSC8/20 - report on required resources – ongoing.
- HSSC8/44 – IHO Secretariat reported on the progress made in restoring cross-language links in the Hydrographic Dictionary (HD) database and the intention to link the definitions in the IHO Concept Register (when established) to the HD database.
- HSSC8/58 - Maritime Resource Name scheme to the S-100WG. See S100WG2-8.3. Ongoing.
- HSSC8/62 – Chair discussed with IEHG – but no PCB available yet.
- HSSC8/66 - ICPC did not attend the meeting – no paper submitted – ongoing.

4.2 Proposal 6 for the Assembly

The Chair reported that the 1st IHO Assembly will take place during April. KHOA have submitted a proposal that addresses testing of S-100 standards (and others). She encouraged members to go through the KHOA proposal and provide comments for their national delegations to the Assembly (**Action 01**).

5. Reports of Activities of Other Working Groups

5.1 NIPWG

The HSSC have instructed the NIPWG to prioritise the S-122 and S-123 Product Specifications. Some S-123 test data has been produced and these are stable. Additional work is being conducted under an IHO contract. Further development on S-125 has been postponed due to a lack of resources. Test data sets have been produced for S-128 and are available for use. An S-128 application schema is under development. NIPWG proposed to extend the implementation of the NauticalInformation information type in the S-101 DCEG by adding a complex attribute to replace the pictorialRepresentation attribute. This was not supported by industry members. NIPWG also proposed to add a new attribute “authority” to cable features in S-101 so as to provide details of the owners/operators of submarine cables. This was also rejected by the WG in favour of providing this information using an associated instance of the ContactDetails information type (**Action 02**). The meeting noted the interaction matrix provided in the NIPWG report.

5.2 NCWG

MH reported that he had taken over the NCWG chairmanship role of chair from JW. The last NCWG meeting took place in Monaco in April 2016. Edition 4.6.0 of IHO publication S-4 was published in April 2016. A new revision 4.7.0 of S-4 was approved at HSSC8 and is currently out for IHO Member State approval. This revision includes new guidance for manually activated AtoN, Sub-surface pipelines, Sea grass (Sg) and bubble curtains. Other items being progressed by the WG include a paper on “options for the future of the paper chart”. The meeting noted the report.

5.3 DQWG

No paper provided, and as there were no representative for the meeting, there was not discussion.

5.4 TWCWG

No report provided, and no discussion.

5.5 ENCWG

No paper provided and no discussion, noting that the ENCWG meeting was to be held in Genoa the following week.

6. Activities of Other Organizations

6.1 IALA

See IALA papers on Session Oriented Services (agenda item 08.2) and Maritime Resource Identifiers (agenda item 08.3).

6.2 ISO

TP reported on the ISO/TC211 standards, specifications and work activities. He invited meeting participants to review the document update status table included in the report, and highlighted some of the resources provided by the Technical Committee. The meeting noted the report.

6.3 IEC

HP reported that since the completion of 2015 Edition of ISO/IEC 61174, there were no plans to produce a new edition in the immediate future. He noted that there were several e-navigation test bed projects that were planning to use the route exchange product specification being developed by IEC, and this project was taking on a higher priority. The meeting noted the report.

6.4 WMO JCOMM ETMSS

Brazil (CdM) (representing ETMSS) reported that their primary objective is to have weather information presented as an overlay in ECDIS. He proposed that this information is very important for situational awareness and it will soon be a mandatory requirement for ECDIS.

JCOMM also have an expert group on safety services. This expert group have modelled and reviewed all items that are to be proposed to the IHO GI Registry to support their S-100 based Product Specification development. It is anticipated that their Feature Catalogue should be completed by April 2017, however IHO Secretariat (JW) will need to discuss their Codelist attribute type modelling with them pending the outcomes of related discussions at the meeting (**Action 03**). Work is being progressed on the development of their SVG point symbols. They are using GML and/or HDF5 as encoding formats.

There are some issues relating to datasets crossing the 180 degree line. HB proposed that this should not be an issue for datasets covering a reasonable extent however those covering a very large extent may have problems.

The meeting noted the report.

6.5 DGIWG

No paper – no report provided.

6.6 IOGP

The Chair reported that there were two items of work being undertaken by the International Association of Oil and Gas Producers (IOGP) that the WG should be aware of. These are the OGP / IPIECA Oil Spill Response Common Operating Picture (COP), and Seabed Survey Data Model (SSDM).

She reported that IOGP had published a new “Guideline for the Delivery of Seabed Survey Data” specification document in January 2017. The meeting noted the report.

6.7 GMWG (Geospatial Maritime Working Group)

No paper – no report provided.

6.8 IMO

TP reported that the IHO Secretariat (D-Tech) had attended the NCSR4 meeting (IMO London) during the previous week. The following issues relevant to the WG are reported in the late paper.

Interconnection of NAVTEX and Inmarsat SafetyNET receivers and their display on Integrated Navigation Display Systems. If this is approved at the next MSC meeting (June 17) it could have implications for S-124 development and possibly S-100.

MSC resolution 252(83) concerning the harmonization of bridge design and display of information; it was agreed to propose to the MSC not to develop further at this stage the proposed additional modules to the Revised Performance Standards (no impact for S-100WG).

NCSR will establish a Correspondence Group to continue the development of Guidelines for the Harmonized Display of Navigation Information Received via Communications Equipment. TP invited to WG to consider the guidance provided at Annex A to the paper which makes reference to S-100 - *“equipment should be displayed based on the portrayal specifications of the S-100 standard”*. Chair also pointed out that *“data streaming”* is explicitly mentioned in Annex B.

The most significant item of the report was the report on the proposal to activate the IMO-IHO Harmonization Group on Data Modelling (HGDM) to provide assistance and support with the implementation of e-navigation. The Sub-committee decided to submit the proposal to activate the group to the MSC. The Chair invited the meeting to consider the two main items in the report concerning development of a Common Maritime Data Structure (CMDS) necessary to support Maritime Service Portfolios (MSPs); and the potential impact on S-100 and the related IHO GI Registry. WG members are invited to follow the outcome of MSC – June 17.

The meeting noted the report and agreed that items raised in the report need to be followed up subject to outcomes of MSC98.

7. S100WG Project Team Updates

7.1 S-102 Update

DB reported that the draft section 9.0 dealing with S-102 portrayal had been delayed, however the current goal is to include this in Edition 2.0 for submission to the HSSC9 meeting (November 2017). He noted that the Edition 2.0.0 working draft contains a number of additions and updates. These include feedback received from WG members, portrayal schemes, additional metadata, guidance on the use of HDF5 and surface generalization. A breakout group was convened to discuss portrayal and surface generalization. This breakout session further refined the portrayal requirements for the bathymetric surface, and safety depth and other depth contour requirements for display of S-102 data.

7.2 S-121 Maritime Limits and Boundaries.

TP reported that the S-121 Working Group had submitted a product specification document to the HSSC8 meeting. He had attended the first S-121 meeting that took place in December 2016 at the UN-DOALAS. He informed the meeting that the PT consider that one of the prime uses of S-121 is for the deposit of Maritime Limits and Boundaries with the UN Division for Ocean Affairs and the Law of the Sea (DOALOS) by nations in a form that can be used in adjudicating legal claims; and in order to achieve this S-121 must define a text based delimited encoding format that can be easily printed and read. The PT have developed a model and identified the required Features and attributes. This includes an implementation of the ISO-19152 Land Administration Domain Model and S-100 information types (objects). The Chair questioned the need for a separate domain for maritime limits, and noted that any such request would have to follow the standard procedure. JP noted that he was a member of the PT and had provided input to the draft model. The meeting noted the report.

7.3 S-129 Under-Keel Clearance Management

NL (Chair S-129PT) reported that the 2nd UKCPT Meeting had taken place from 13 - 14 March 17 also in Genoa. He reported that the meeting had discussed the concept of displaying 'go' versus 'no-go' areas. It is anticipated that the PS will make use of the Route Exchange specification currently being developed by the IEC. He also reported that there was some discussion about determining the shallowest point within a proposed route being covered by a UKC service. The PT is also studying data transfer methods / mechanisms and has developed a road map for the way ahead.

7.4 S-101 ENC Product Specification

Refer to Agenda Item 11

8. S-100 Proposals

8.1 S-100 Edition 3.0.0 Status

The Chair informed the meeting that, in order to meet the demands for new constructs for dependant Product Specifications, S-100 will need to continually evolve. She noted that to date only new editions of the standard have been produced, but in the future revisions may also be produced to cater for minor changes. She outlined the proposed maintenance schedule for the S-100 publication and noted that the intention was to provide predictability for the submission and consideration of proposals. The S-100 publication schedule will be published on the IHO web site (**Action 04**).

8.2 Session Oriented Services

Following a presentation on the IALA proposal for Session Oriented Services, and comments from the meeting, a breakout group formed to discuss the proposal and report back to the meeting.

Report form breakout group: AB reported back from the discussion group. Noted that there was consensus that it would be useful for vessel traffic information, vessel tracking etc... He noted that there was probably an important data streaming application for the TWLWG and proposed that data streaming should be included on the next TWLWG meeting agenda. Following a breakout group meeting, AB reported that that the group will identify services that require streaming based encoding and will also consider defining an encoding for streaming using the ISO 8211 format.

The next step is to develop a framework that can be added as a separate Part to the next edition of S-100. This extension to S-100 should be prepared for the 2018 S-100WG meeting (S-100WG3) (**Action 05**).

8.3 IALA Unique Identifier Specification

LS reported that IALA had developed guidelines on Unique Identifiers for Maritime Resources as a method for creating globally unique identifiers. It is proposed that navigationally unique object identifiers will be required by e-Navigation to maintain harmonization across domains and services.

Currently the S-201 Product Specification includes the concept of a unique ID Code, which is available for all features. However the current draft has no references to Maritime Resource Names (MRN). Due to the similar structure of the S-101 and S-201 Product Specifications, it is proposed that the concept of MRNs should be implemented and harmonized between the two Product Specifications.

The meeting also considered that the concept of the MRN needs to be added to S-101 and S-201 in order to achieve interoperability benefits for future S-100 PS. The meeting agreed that this should be considered for inclusion in the next Edition of S-100 (**Action 06**).

8.4 GeoPackage - OGC Specification for Data Encoding and Packaging

TP reported on a new Open Geospatial Consortium (OGC) specification called GeoPackage, which is an open, standards-based, platform independent, portable, self-describing, compact format for transferring geospatial information. He invited the S-100WG to consider whether GeoPackage could be used to improve data product delivery for future S-10X based products.

MS reported that SPAWAR had carried out a preliminary study of GeoPackage, and considered that it needs some additional enhancements before it could be used for S-10X products. The meeting agreed that no further action was required at this stage but further development should be monitored.

8.5 Producer and Agency Codes for S-100

TP reported that there are constructs in the current S-57 producer codes are not suitable for supporting S-100 products and services. The current S-62 database that is used to generate the PDF list of codes, is to be expanded and integrated into the Registry application. He also noted that the WG needs to consider how producer agency codes would be used for S-10X product file names, and highlighted the proposals made by KHOA and Primar, as presented in paper 8.5A. The meeting agreed that user agency code information should be made available as a code list resource (**Actions 07 and 08**).

8.6 Changes to GML Encoding Architecture

The Chair reported that this paper had been withdrawn prior to the meeting.

8.7 General Data Model in S-100

MS proposed that S-100 should define a General Data Model rather than just using the General Feature Model and product-specific Application Schemas. SevenCs supported the concept and proposed that if the WG wanted to develop generic S-100 applications (such as a viewer), it would need to define a General Data Model. Furthermore it was agreed that this should provide consistent, product-independent rules for mapping between interchange files and datasets; mapping datasets to portrayal input; and enforcing restrictions defined by a Feature Catalogue.

The WG approved the formation of a team that will develop an update for Part 3 of the S-100 specification, as described in the paper (to be led by SPAWAR). [Members: JP, HB, MS, SPAWAR-lead] (**Actions 09 and 10**).

8.8 Changes to Support a Generic S-100 Viewer

MS highlighted issues encountered while attempting to develop a generic, product-agnostic S-100 viewer.

An exchange set is required for signature verification, decryption, decompression, and determination of a datasets encoding, but the S-57 to S-101 converter does not yet generate one.

He recommended that metadata should be added to the Portrayal Catalogue to unambiguously specify which Feature Catalogue it should be used with (and visa-versa). Furthermore, the schema of this metadata should match the S100_CatalogueMetadata used to distribute the Feature Catalogue. In response to the proposed recommendations, the meeting agreed the following;

1. Modify the S-57 converter: This was agreed in principle, however it would be dependent on the availability of resources.
2. Modify S-100 3.0.0 Part 4a S100_DatasetDiscoveryMetaData: digitalSignatureReference description to read "Algorithm used to compute the digital signature". This was agreed and proposed to be done as part of the metadata review.
3. Modify S-100 3.0 Part 4a S100_DatasetDiscoveryMetaData:digitalSignatureReference to have a value from a digitalSignature class, similar to S100_DataFormat: This was agreed and will be done as part of the metadata review.
4. Modify S-100 3.0 Part 4a S100_ExchangeCatalogue:algorithmMethod to have a value from a compressionAlgorithm class, similar to S100_DataFormat: This was agreed and will be done as part of the metadata review.
5. Modify S-100 3.0 Part 4a S100_DatasetDiscoveryMetaData:protectionScheme to have a value from an encryptionAlgorithm class, or specify the allowed algorithm values in the "Remarks" column: This was agreed and will be done as part of the metadata review (**Action 11**).
6. Discourage use of, or remove "Other" from S100_DataFormat. This was agreed, and SPAWAR are to submit an S-100 Change Proposal document (**Action 12**).
7. Remove "ISO/IEC 8211 ASCII" from S100_DataFormat. This was agreed for the next Edition of S-100.
8. Add metadata to the HDF-5 encoding (S-100 Part 10c) matching Part 10a and Part 10b. This was agreed in principle, but the S-102PT was invited to discuss during their breakout session.
9. Add integer attribute S100_ProductSpecification. Number to unambiguously specify the product type: This was agreed. SPAWAR invited to submit a change proposal form noting where the change is required (**Action 13**).
10. Add metadata to the encodings and/or the S100_DatasetDiscoveryMetaData to specify the appropriate Feature Catalogue. Agreed in principle - SPAWAR to submit proposal form noting where the change is required (**Action 14**).
11. Modify the S-57 converter so that it stores the metadata necessary to identify the Feature Catalogue associated with each converted dataset into the encoding /

S100_DatasetDiscoveryMetaData. This was agreed in principle. SPAWAR to submit proposal form noting where the changes are required (**Action 15**).

12. Modify the Portrayal Catalogue Schema to unambiguously specify the Feature Catalogue. The Chair noted that there is already a mechanism for this. The proposal was not agreed.

13. Provide future feature and portrayal catalogues as part of the exchange set. The proposal was not agreed, citing as an example ENC Updates.

8.9 Recommended Changes to S-100 Portrayal

MS recommend the removal of the productId and version attributes from the Portrayal Catalogue Schema. The Working Group proposed that "S100_ProductSpecification" from the S100_CatalogueMetadata should be used to determine the appropriate product type and version.

The Working Group recommend modifying the 9-A-1 MaskedRelation type so that it contains zero or more InformationAssociations.

After further discussion, it was agreed that a Sub-Group (to be led by SPAWAR) should be formed to discuss the proposed changes and submit requests for the agreed changes using the change proposal forms. [Members: HB, EK, HP, CdM, HA, JLP, SO, SPAWAR (lead)] (**Actions 16 and 17**).

8.10 Removal of ISO 8211 ASCII Encoding

SPARWAR reported that ASCII format of the ISO 8211 encoding was not relevant for S-100 based products. The ASCII form does not provide any added value, and its inclusion is confusing for implementers. This was supported by Furuno and SevenCs and agreed by the meeting (**Action 18**).

9. S-100 Infrastructure Updates

9.1 Update on the S-100 Registry (FCD/Portrayal)

The Chair provided a brief summary of the status of the IHO Geospatial Information (GI) Registry, the Feature Catalogue Builder and the Portrayal Catalogue Builder. She was pleased to report that ROK have stood up a working Portrayal Catalogue Builder and were in the process of testing this.

9.2 Current Status of the IHO Registry

IHO Secretariat (TSSO - JW) reported on the current status of the IHO Registry application. A new database and Registry interface application has been developed by the KHOA, and became functional in 2016. JW has taken over the post of Registry Manager at the IHO Secretariat (October 2016) and a significant number of features / attributes have since been submitted. He reported that as a result of the functional implementation of the registry, a number of issues had been identified. These are being addressed in cooperation with the ROK (KHOA), however the major issues identified were the subject of additional papers to the S-100WG2 meeting.

JW reported that the main issue identified is that the Feature Concept Dictionary Register (FCD) is intended to cater for multiple domains, however the current Register structure does not allow for this. A single concept can be modelled in multiple ways based on the requirements of individual user community. This has resulted in FCD having multiple instances of the same concept being registered in different states (e.g. as feature / attribute / enumerate; or as different enumerate values). This also has an impact on the registration process described in S-99.

During the meeting, JW provided a demonstration of the IHO GI Registry interface; and YB provided a demonstration of the functionality of the Feature and Portrayal Catalogue Builders.

9.3A Proposed Extension to the IHO Registry

TP proposed that Registry model specified in ISO 19126 may be suitable for a single domain Registry, however it is not suitable for a multi-domain Registry (such as the IHO GI Registry). The current structure is making the maintenance and management of the Feature and Attribute types difficult. He proposed that the IHO GI Registry should be extended to include a “Concept Register” (CR) which will make provision for a lower level of abstraction of “Concepts”. It will also be necessary to move certain metadata items from the current Feature Concept Dictionary Register to the Concept Register, and make appropriate changes to reflect any changes in S-99. The meeting approved the proposal and invited the KHOA and IHO Secretariat to produce an expanded Registry model for discussion at the next TSM meeting (**Action 19**).

09.3B Semantic Web Standards for S-100

CM reported that the paper had been produced in response to HSSC8 action HSSC8/18. He noted that the semantic web is designed to provide online data that can be used by computer programs, rather than humans. It requires information to be structured into a knowledge database consisting of a network that represents semantic relations between concepts. The benefits of building an RDF-based data model, and the use semantic web standards include: improved discoverability (applications to consume metadata from multiple catalogues); better interoperability across sectors; and in the absence of interconnection, machine-readable interoperability.

The meeting was receptive to the proposals in the paper, and agreed that they complemented the proposal to extend the IHO GI Registry outlined in paper 9.3A. It was agreed that JP would discuss the items raised in the paper at the upcoming OGC meeting (**Action 20**).

The chair noted that it was premature to develop a technical cooperation agreement with the JRC or reporting to the IHO-EU Networking Working Group (IENWG).

9.4 Registry Proposal Guidelines

The IHO Secretariat (TSSO – JW) noted that S-99 and the draft GI Registry User Guide provide an overview for the operation and management of the GI Registry and GI Registry interface. There is however no guidance for Submitting Organizations to follow when developing proposals. There is also no guidance that the Register Manager can use to assess the suitability of submitted proposals; or the Domain Control Bodies to use when assessing proposals to their Domain. This has made it difficult for the Register Manager to enforce consistency in the Register content. The meeting supported the proposals presented in the paper and agreed that a guideline document explaining how to develop, submit and evaluate proposals to the IHO GI Registry should be developed for inclusion as an Annex to S-99 (**Action 21**).

The meeting approved the establishment of an S-100WG Project Team (IHO GI Registry Project Team) under the S-100WG to oversee the development of the guidelines and to be the S-100WG first point of contact any future issues related to the development, structure and content of the IHO GI Registry (**Action 22**).

9.5 Review of IHO GI Registry Content

The IHO secretariat (TSSO – JW) reported that there are multiple instances of duplicate objects within the Feature Concept Dictionary Register which is contributing to inconsistent / incomplete

content and is also proving to be confusion for Submitting Organizations and Domain Control Bodies. He also cited examples of inappropriate (e.g. unduly long) concept names for valid features in the Register.

He proposed that a systematic review of the content of the FCD be carried out. The content needs to be rationalized and checked to ensure that it is in conformance with accepted IHO GI Registry content conventions and guidelines. The meeting agreed to the formation of a Sub-WG to carry out a review of the Feature Concept Dictionary Register. [Members: YB, CM, JLP, JW (lead)] (**Action 23**).

9.6 Use of Codelists

The IHO Secretariat (TSSO – JW) noted that the S-100WG has little experience in the use of the Codelist Attribute type and further guidance is needed in the S-100 document (and probably associated Product Specifications). He reported that some concerns had been raised by some FCD Register Domain representatives that the Codelist type should remain as an enumerated attribute type. He proposed that further guidance needed to be developed on the format / structure and use of Codelists.

HB – noted the use of Codelists should be limited, because they have the potential to introduce variances in format which lead to interoperability issues (if not managed correctly). His conclusion was that where an enumerated list can be used, it should be used. It was agreed that the WG needs to provide additional guidance on the use of Codelists, and this needs to be included in the IHO GI Registry guidelines document. HB also recommended to review the Codelist section in the S-100 document, noting that it is currently “too open”. Codelists will not be included in the Feature Catalogue – they will be referenced as an external resource (**Action 24**).

9.7 Impact of Changes on S-99

IHO Secretariat (TSSO – JW) noted that since the operational use of the Registry, it has become evident that there is a need to update and enhance the S-99 publication. He proposed that a small group task group be established to conduct this work. The meeting decided that it was too premature to conduct the review at this stage, noting the proposal to introduce a Concept Register. This will require the realignment of the proposal procedure as it is currently documented in S-99. However, it was decided that a review of S-99 should be conducted in association with the implementation of the Concept Register and progression of other related actions from this meeting (**Action 25**).

9.8A S-100 Feature Catalogue Builder

JL informed the meeting that since the last S-100 meeting a number of changes had been made to the S-100 Feature Catalogue Builder (FCB) to align to the new Registry database structure. The concept of super type and sub type has been added, and some errors in the software were sorted out. Enhancements have also been made to improve the registration and structure of complex attributes.

He invited the S-100WG to review the S-100 FCB applications, and noted that future activities included compiling a user manual and create an installation version of the FCB.

The Chair thanked KHOA for the extensive work that has been done. She reported that the application will soon be released to those Project Teams developing Product Specifications for testing, however it was agreed that it should not be made available on the IHO web site (**Action 26**). SPAWAR noted that they would be prepared to test the application and provide feedback to KHOA.

The Chair invited the WG members to review the design documents and Feature Catalogue files provided as meeting documents, and provide any feedback directly to KHOA (**Action 27**).

9.8B S-100 Feature Catalogue Edition 0.9.0 (see also xml file)

JL reported that version 0.9.0 of the S-101 Feature Catalogue had been produced for the S-100 Test Bed activities. He reported that it had been built using the S-100 Feature Catalogue Builder Edition 2.0.0 and feature data from the FCD dated at the end of January 2017. He outlined the additional items that need further development.

The FC version 0.9.0 is in compliance with the latest version the S-101 Data Classification and Encoding Guide (DCEG) and once the remaining items have been resolved, the FC will be updated accordingly (**Action 28**).

9.9 S-100 Portrayal Catalogue Builder (PCB)

No paper provided. The Chair reported that the PCB that had been developed under contract was available online and was in the process of being tested. Further development of the PCB was currently under consideration.

10. General Topics

10.1 Proposed Extensions to the IHO Registry [See S100WG2-9.3]

The Chair noted that this had been discussed under item S100WG2-9.3.

10.2 IHO Registry Management and Domain Control Bodies [Powell]

The Chair reported that S-99 currently requires the establishment of a Domain Control Body for each of the IHO GI Registry Registers; and an Executive Control Body consisting of representatives from each of the Register Domains. Furthermore she noted that HSSC8 action 14 tasked the S-100WG to establish a Domain Control Body (DCB), and an Executive Control Body (ECB) for the IHO FCD Register; and an Expert Group for the HYDRO domain. TORs will need to be drafted for each of the bodies.

In order to establish a cross-domain Control Body, each of the Domain Owners should nominate a representative to serve on each of an Executive Control Body and a Domain Control Body for the FCD Register.

For the IHO Hydro Domain "Expert Group", it was agreed to approach the NIPWG to nominate 3 members of their WG to participate in the Group (**Action 28**).

10.3 S-100 Interoperability Specification

EK reported that an initial version of the Interoperability Catalogue design had been completed. The first edition had been presented to the S-100 Test Strategy Meeting (Rostock, Germany - September 2016). Following discussion at this meeting the current draft Edition (March 2017) had been produced. The main components of the specification include UML models; XML schemas; and a draft XML Interoperability Catalogue (dated March 2017).

He invited S-100WG members to review the associated model, schemas and catalogues available on the meeting download page, and provide any feedback to him (**Action 29**).

10.4 S-100 Test Bed Update

No paper submitted. JP provided an update on the test bed projects that have been conducted. No testing on the PCB has been carried out yet. The Feature Catalogue Builder application will soon be released for testing. Significant progress had been made with S-102 testing. More work needs to be done on data validation and security development and testing. The data security / authentication section is near completion and will be included in S-100 Edition 4.0.0.

10.5A S-100 Test Bed Framework

The Chair informed the meeting that S-100 and S-101 have reached the stage where testing needs to be carried out. The Test Bed framework document, which is based on a system engineering approach, provides a framework for the incremental testing of the systems that implement S-100 based products and services. However it was noted that Basecamp is not an appropriate option for hosting the test site. The Chair invited S-100WG members to review the draft Test Bed Framework document S-100WG2-10.5 and provide any feedback to her (**Actions 30 and 31**).

10.5B S-10X Test Bed Dataset and Test Site

YB reported that the intention of the paper was to propose an efficient way to create and share S-100 based TDS and demonstrate how to display multiple product layers and services on top of the foundation ENC cells. The ability to display product layers for S-101 ENC, S-102 Bathymetric Surface, S-111 Surface Currents and S-412 Weather Overlay etc... needs to be tested. This also needs to be tested for complex data loading scenarios.

He highlighted some of the PS's under development and noted that very few of them have test datasets and Feature / Portrayal Catalogues available yet. He proposed that, in order to fully test the Interoperability Specification, the S-100WG should establish S-100 test site where all TDS can be downloaded; and all associated documentation such as the Product Specifications, Feature Catalogues, Portrayal Catalogues ... etc. should be made available for download.

He also proposed that test datasets for different locations around the world should be created in order to ensure that many geographic environments/scenarios are covered.

10.6 S-100 Data Protection

JP reported that the current Edition of S-63 has been moved under the responsibility of the ENCWG. The task of developing data security for S-100 products and services had been moved by the HSSC under the responsibility of the S-100WG, and the Data Protection Scheme Working Group had been disbanded. S-101 will require service elements (for ECDIS) which include service.xml and specification for ENC Update status reports. (Service.xml will replace the current PRODUCTS.TXT file)

Other product specifications will be able to use the same service elements and S-100 algorithms for implementing their own data protection requirements. The S-100 digital signatures will be used separately for integrity checks. Backward compatibility with the current scheme will require further consideration.

Other issues that will require further consideration relate to whether there is a need for multiple Scheme Administrators – i.e. in addition to the IHO Secretariat?

It was decided to establish a Data Protection Scheme Sub-WG to consider all S-100-related data protection issues. [Members: CI, HP, SS, HB, LH, TP, JP (lead)] (**Action 32**).

10.7 Use of the IALA Reporting Guidelines for S-100 Test Beds

The Chair reported that IALA have established a framework for documenting test bed projects under development for e-Navigation. It provides a guideline for reporting the results of test bed exercises. The S-100 test bed framework currently under development does not include guidance or a mechanism for reporting on results of test bed projects, and making the information available for dissemination.

The Chair proposed that the S-100WG adopt the IALA Guideline 1107 for reporting of test beds and set up a repository similar to that of IALA for those developing S-100 test bed projects; and for reporting on their outcomes.

The meeting agreed to adopt the IALA Guideline 1107 for documenting and reporting on test bed projects (**Action 33**).

10.8 S-100 Portrayal Support of Lua

SPAWAR reported that at the TSM meeting, SPAWAR had proposed the use of the Lua scripting language rather than XSLT for the processing of conditional portrayal rules. To test the concept SPAWAR had updated their S-101 viewer to allow the use of both (Lua and XSL) technologies.

The meeting agreed that the Lua should be a complimentary solution to the XSLT conditional procedures as described in the paper (**Actions 34 and 35**).

10.9 SPAWAR S-100 Viewer Update

MS reported that the main objective of developing the S-100 viewer was to determine whether it is possible to support other S-100 based products (in addition to S-101). As part of the development SPAWAR carried out a review of the S-100 Version 3.0.0 draft Specification. The S-100 Viewer makes provision for both the XSLT and Lua portrayal rules.

SPAWAR invited WG members to download the latest version of the S-100 Viewer from basecamp site and report any anomalies.

10.10 Roles and relationships in the GI Registry and FCB

SO reported that there is currently no function in the FCD Register for managing feature associations and roles within the GI Registry (with the exception with a few that are hardcoded). Furthermore, the FCB is not able to build feature associations and roles when compiling a Feature Catalogue. From experience gained with building the S-101 and S-201 Product Specifications, it has been concluded that it would be better to include them directly in the Feature Catalogue. This would require that the FCB be extended to define and modify roles and feature associations when building a FC. It would then not be necessary to store / manage them in the GI Registry. Agreed to handle roles and responsibilities in the Feature Catalogue (**Actions 36 and 37**).

10.11 Proposed S-102 Improvements

SS noted that S-102 datasets will have a correlation S-101 ENCs and both will be used to support safe navigation. S-102 defines a broad selection of coordinate reference systems and there is concern that this will create unnecessary challenges for the OEMs that need to support all of these reference systems. He proposed that the choice of coordinate system used should be strictly limited when being used for navigational purposes. This will avoid time-consuming recalculating and aligning in end user systems.

He further proposed that clarification text needs to be added to S-102 to restrict the choice of projected CRS's (such as UTM in WGS84 and polar stereographic) when being used in conjunction with ENCs. Furthermore the CRS should be defined as an EPSG CRS. The definition of CRS must also not contain undocumented extensions as is currently the case with some S-102 files that have been produced.

SS noted that a cancellation is described as a type of dataset file where the dataset is cancelled and is deleted from the system. It is not clear what should happen if there is no replacement i.e. how should such a cancel message be delivered? He questioned whether there should be additional fields in the S102_ExchangeCatalogue carrying that information?

He reported that several gridding options are available when extracting a grid from the surface and noted that S-102 should describe the importance of keeping safety of navigation in mind when creating S-102 for navigational purpose.

SS proposed that portrayal rules need to be established for the interaction between S-102 and the S-101 products. He proposed that two types of portrayal should be defined. These should include a colour ramp that replaces the ENC skin-of-the-earth features; and a two colour scheme for depicting safe/unsafe waters based on the vessels context parameter.

Digital signatures – SS proposed to establish an S_100 Digital Signature class that contains all attributes required to authenticate a digital signature for a file.

It was decided that the issues and proposals identified in the paper would be addressed by a S-102PT break-out meeting. The record of this meeting, including decisions and actions, is included at Annex D.

10.12 Norwegian S-102 Testbed

SS reported that In 2017 PRIMAR and its partners commenced work on the development of a demonstrator for the distribution and use of S-102 bathymetry data in an operational environment. A main objective is to develop methods and solutions that can be reused for later implementation of S-100 derived product solutions.

PRIMAR are also developing a web based S-102 viewer for use as an OGC Web Map Service (WMS). A solution for OGC Web Chart Service (WCS) will be developed at a later stage. It is anticipated that validation tests that can be used as part of a validation test annex in the future S-101 work will also be developed.

The meeting noted the report and commended PRIMAR for the progress that they have made.

France noted that there may be some security issues relating to provision of high resolution bathymetry – especially when it is within a nations territorial waters; as well as issues pertaining to product liability in terms of SOLAS navigation.

10.13 S-100 Exchange Catalogue Schema

JP reported that S-100 Part 4a (Metadata) was revised in 2016 in preparation for Edition 3.0. This included several minor changes to S-100 discovery metadata and the exchange set model. She reported that the XML schemas prepared for edition 2.0 need to be updated accordingly. The XML schema are provided as an enclosed zip file under this agenda item on the S-100WG2 meeting page of the IHO web site for download.

She noted that Raphael Malyankar had found some inconsistencies in the catalogue file and there have been some revisions to the metadata elements, e.g. catalogue metadata is now optional. The old Edition 2.0.0 has now been updated to bring it in line with S-100 Edition 3.0.0. The WG noted that paper and approved the updated schema.

10.14 KHOA S-100 Viewer Update

SO reported that work has been done on extending the S-100 viewer in order to incorporate different types of S-100 based products and to include additional capabilities such as processing exchange sets, support files, comprehensive metadata information, S-102 datasets and the S-100 portrayal mechanisms.

In order to support the S-100 viewer, exchange sets for each S-10X product specification (including Feature and Portrayal Catalogues) will be required.

10.15 S-100 Sea trial (Gunsan and Busan)

JL reported that KHOA have an ongoing project to test S-10X Product Specifications. During the last project in 2016, seven types of test datasets were created and sea trials were carried in the areas of Port Gunsan and Busan (Korea). The NOAA/ESRI S-101 Converter application was used to convert S-57 data to S-101, and the KHOA S-101 Editor was used to input new items in the datasets. S-102 datasets were produced using the Open Navigation Surface Working Group Editor. S-111 Surface Current datasets were created using the KHOA S-111 Editor. S-112 Dynamic Water Level Transfer information was provided using the KHOA ASM Message 8 Encoder – water level service system, connecting with AtoN AIS. S-124 Navigational Warnings were provided using a KHOA Editor developed in-house.

KHOA will hold a further sea trial project to test S-100 interoperability guidelines and invited S-100WG members to participate in the sea trial, which will be held around October 2017.

10.16 S-128 Catalogues of Nautical Catalogues

SO provided a progress report that the S-128 Catalogue of Nautical Products group had identified the following types of nautical product to be included as catalogues: paper charts and ENCs; nautical publications such as Sailing Directions, Light Tables, Tide Tables; various thematic maps; e-Navigation services; and S-100 based products (S-10X). A draft application schema has been produced; there was still some ongoing discussion regarding the data model and discovery metadata. He noted that there may be an overlap with the S-63 protection/distribution specification.

SO welcomed feedback on the progress of S-128 development.

10.17 Proposed Test Cases for the S-100 Initial Data Conversion Tool

JP reported that the NATO Geospatial Maritime Working Group (GMWG) has an action to propose test cases for the S-100 Converter for consideration by S-100WG2. He invited members to review the test cases included as Annex A to the document, and consider including them in the S-100 Converter application. Furthermore he invited the WG to review the proposed test cases for the S-100 Converter and consider developing them into an agreed set of test cases.

It was agreed to include the proposed test cases for the initial S-100 conversion tool in the test case document (**Action 38**).

10.18 Cyber Security Issues

HP provided an overview of the potential cyber security issues facing ECDIS manufacturers and data providers.

He proposed that S-100 edition 4.0.0 should include a section on cyber security and service aspects. This should also provide guidance to those developing S-10X based product specifications. He proposed that the work should take into consideration requirements for e-Navigation development activities as well. The meeting noted the issues presented in the paper, and agreed that the provision for data security, encryption and cyber security should be included in S-100 for use in S-10X based products. The Chair reported that this had already been included as a Work Item in the S-100WG Work Plan.

11. S-101 Project Team Topics

11.1 Status of S-101 Documents and Resources

11.1A S-101 DCEG Status Paper

JW reported that Baseline Edition 0.0.1 of the S-101 Data Classification and Encoding Guide (DCEG) had been published in April 2014. Since then, a cumulative list of changes/additions has been compiled for inclusion in Edition 0.0.2 of the DCEG. Edition 0.0.2 was prepared for consideration of the S-101PT in June 2016 and approved by the Project Team in August 2016; however this version of DCEG 0.0.2 was not published on the S-100WG page of the IHO web site for implementation in IHO GI Registry and S-100 test beds. Since August 2016, a number of additional changes have been made to the draft, and a revised version 0.0.2 had been prepared.

The WG convened a breakout to review the pending items listed in the Change Log spreadsheet and endorse the draft Baseline DCEG Edition 0.0.2 document. This was done in addition to resolving the issues raised at paper 9.8B, and the final Baseline DCEG Edition 0.0.2 was approved by the meeting (**Action 39**).

11.2 S-101 Conditional Symbology Portrayal Way Forward

The Chair reported on the current status of the S-52 Conditional Symbology Procedures (for use in S-101). A questionnaire had been sent distributed to determine which CSPs were still valid.

MS reported that SPAWAR had carried out an investigation to determine if there are more efficient ways to implement the CSPs in S-100, and had presented a solution using the Lua scripting language to the TSM in September 2016.

A breakout group was convened to discuss the two approaches. It was concluded that provision for both approaches should be considered. SPAWAR agreed to develop the Lua Portrayal documentation for S-100 and S-101 (**Action 40**).

11.3 Generic S-101 Portrayal of Radar

MS reported that the S-101 Product Specification and Portrayal Catalogue require specific processing of the portrayal draw instructions when a RADAR overlay is enabled. He proposed that a generic (S-100 conformant) specification for displaying RADAR overlay be implemented. This will require the addition of a RADAR_OVERLAY portrayal context parameter to the S-101 Portrayal Catalogue and modification to the portrayal rules. The special RADAR processing rules will have to be removed from

the S-101 product specification. The meeting approved the drafting of the necessary text to make provision for the generic (S-100 conformant) display of RADAR overlay information (**Action 41**).

The meeting noted the SPAWAR paper (**Action 42**).

11.4 S-101 Validation – a way forward?

The Chair reported that data validation had been discussed at the 2016 S-101PT1 meeting. The meeting had identified that checks should be grouped into: Critical errors; Errors; Warnings; assessment of Check 2000; and new checks related to S-101. It was agreed that the current S-58 document should be used as a baseline document for the new specification.

It was agreed to form a Sub-WG under the S-101PT to draft the ENC Validation Checks document for S-101. [Members: CM, OF, NOAA (representative TBC), SevenCs (representative TBC), IC-ENC (representative TBC), JW, RF (lead)] (**Action 43**).

HB stated that SevenCs (Frank Hippman) are willing to do some implementation when a draft set of checks has been developed.

11.5 Proposal to Extend the S-101 Data Model

CT reported that the NIPWG is using a richer model of Nautical Information than the S-101 DCEG currently contains and therefore binds different attributes to Nautical Information in place of pictorial representation and information.

Harmonization of commonly used features and information types is highly desirable in order to facilitate reuse of portrayal, UI displays and controls, and application software modules. JW reported that the NIPWG model for the Nautical Information information type had already been taken into consideration and implemented for S-101, with not all sub-attributes required for the navigational ENC. The validity of the requirement to include pictorial information in ENCs was questioned, and it was decided that further information was required regarding the use of the S-57 PICREP attribute in ENCs (see agenda item 11.9).

It was also agreed that additional guidance was required in the S-101 DCEG for the provision of information regarding the owners/operators of submarine cables (**Action 44**).

11.6 ENC Update Limitations

SS proposed that, in order to avoid file extension conflicts between S-57/S-101, updates and other S-100 derived products, the S-57 and S-101 Product Specifications should be amended to restrict the number of updates to be no more than 99 before issuing a new edition.

HB stated that SevenCs are not in favour of the two solutions proposed. File naming conventions should be defined in the Product Specification. The Chair noted that this should also be discussed at the ENCWG meeting. Canada agreed with the SevenCs position.

The proposal was not agreed by the meeting. However, based on comments from RoK (KHOA) and PRIMAR, it was agreed that further investigation into file naming conventions for S-100 based products was required (**Action 45**).

11.7 Improvement of ENCs display on ECDIS

CM reported that the compilation of this paper had been prompted as a result of complaints from the French navy about ENC portrayal. One of the main issues is caused because ENCs have been derived from the paper chart and include the same content, without consideration of the additional

functionality and display issues of ECDIS. He recommended that a NCWG, ENCWG and S-100WG joint Sub-WG be formed to address the shortcomings highlighted in the paper.

It was decided to form a Sub-WG under the S-101PT. [Members: AU (representative TBC), FM, PP (TBC), OF, DG, HP, SS, RF, UKHO (representative TBC), CT, KI, FMK, LH, EK, GT, MB, JW, CM (lead)] **(Action 46)**.

It was decided to also invite contributions from the NCWG and ENCWG.

The Sub-WG is to be tasked with making an assessment of the current situation as regards to the display of ENCs on the ECDIS (this paper could be one of the inputs). This assessment would have to contain an exhaustive list of “issues to solve”. Then, the relevant IHO WGs would have to study how they can improve the standards they are in charge of, to solve the issues identified.

11.8 Proposals from NATO GMWG for S-101

JP informed the meeting that NATO Geospatial Maritime Working Group (GMWG) is currently developing a new AML+ data Product Specification built on S-100 and propose some changes to S-101 to make provision for this.

The proposal (A) concerning changing the data type of the Maritime Mobile Identity Service (MMSI) simple attribute from an integer to a string was agreed.

The proposal (B) to remove the complex attribute “Orientation” and replace it by adding “Orientation Value” in its place was approved.

The proposal (C) to add the value “Mean Tide Level” to the list of enumerate values for the attribute Vertical Datum was agreed **(Action 47)**.

The proposal (D) to separate Mooring Buoy as a new feature thus allowing the attributes Buoy Shape, Colour and Colour Pattern to be removed was “approved in principle”. JW offered to research previous discussions on this proposal and identify a recommended way forward **(Action 48)**.

11.9 Ancillary Files

JP noted that the proposal on ancillary files had been raised and was discussed 4 years ago. There is still an outstanding TSMAD action that has not been completed.

The earlier discussions proposed that there are two options for dealing with text files for S-101 ENCs: embedding TXT information within cells; or accessing TXT/TIF information which is stored at a central location.

HB reported that SevenCs would prefer the embedding option but noted that S-101 makes provision for an “information type” which allows text information to be encoded only once in the dataset, but can be used by many features. He proposed that image files should not be part of the S-101 Product Specification, noting that the (IHO) interpretation of the IMO Performance Standard for ECDIS cannot be satisfied within the feature object and associated encoding standards.

RF questioned whether there is there a need to keep image files in S-101 if this type of information is to be provided in other product specifications being developed by NIPWG. Furthermore the duplication of current TXTDSC information and the small number of (possibly extraneous text files) could be reduced by using a more efficient encoding. He proposed that the maintenance mechanism associated with text files must also be considered.

The meeting agreed that delegates should investigate at their home HO how the current PICREP attribute is used and provide use cases for the retention of this attribute in S-101 (**Action 49**). The remaining recommendations in the paper were tabled for discussion at the next TSM.

11.10 DQWG - Temporal Variation

AM reported that the DQWG has created a model that allow the provision of information about the quality and usage of an ENC. The S-101 Data Classification and Encoding Guide includes a metadata feature "Quality of Bathymetric Data" (M_QUAL) with an attribute "Survey date range" with elements Date End (SUREND) and Date Start (SURSTA). AM recommended that Category of Temporal Variation should be maintained as a mandatory attribute. "Survey Date Range" should also be a mandatory attribute.

JW reported that the attributes and their cardinality as suggested in the paper had already been included in the S-101 DCEG.

12. Any Other Business

No additional business was raised.

13. Review of Meeting Actions

The list of actions was reviewed. The final approved list of actions is at Annex A.

14. Date and Venue of Next Meeting

The chair reported that Singapore had offered to host the next meeting – March / April 2018. This was endorsed by the meeting.

15. Close of Meeting

The Chair thanked the Italian Hydrographic Institute for hosting the meeting and for their warm hospitality. She thanked all Working Group members for their participation and excellent contributions and wished all a safe trip home.

List of Actions

S-100WG2 – Genoa, Italy (15-18 March 2017)				
Action Items				
No.	Item	Action	Who	Status
01	4.2	WG members to go through the KHOA proposal and provide comments for their national delegations to the 1 st General Assembly.	All	Time Expired
02	5.1	Include guidance in the S-101 DCEG for providing cable owner/operator information using an associated instance of the ContactDetails information type.	JW / S-101PT	Complete
03	6.4	IHO Secretariat to discuss current Codelist attribute type modelling with WMO JCOMM pending the outcomes of related discussions at the meeting (agenda item 9.6).	JW	
04	8.1	Post the S-100 revision timeline on the IHO website.	Chair/IHO Sec.	
05	8.2	Develop a framework for session oriented services that can be added as a separate Part to the next edition of S-100, for submission to S-100WG3.	IALA (AB)	
06	8.3	Discuss with IALA who the authority is for the namespace “URN”.	Chair/IHO Sec.	
07	8.5	Develop a draft data structure for the S-100 Producer Code Register.	KHOA / IHO Sec.	
08	8.5	RENCs to further investigate the use of Producer Codes and file naming conventions for S-101, including file name duplication issues.	IC-ENC / PRIMAR	
09	8.7	Sub-WG to be formed to develop the necessary text for the proposed General Data Model for inclusion in S-100 Part 3 Edition 4. Draft for completion for consideration at the next Test Strategy meeting. Members: MS, HB, JP.	SPAWAR (Lead)	
10	8.7	Report on possible GML issue to NIPWG.	Chair	
11	8.8	Apply changes as agreed from recommendations 2-5 of the paper <i>Changes to Support a Generic S-100 Viewer</i> as part of the S-100 metadata review.	JP (Lead)	
12	8.8	Submit a S-100 Change Proposal form to remove “Other” as an allowable value for S100_DataFormat.	SPAWAR	

13	8.8	Submit a S-100 Change Proposal form to add an integer attribute S100_ProductSpecification:number to unambiguously specify the S-100 product type.	SPAWAR	
14	8.8	Submit a S-100 Change Proposal form to add metadata to the encodings and/or the S100_DatasetDiscoveryMetaData to specify the appropriate Feature Catalogue.	SPAWAR	
15	8.8	Submit a S-100 Change Proposal form to modify the S-57 converter so that it stores the metadata necessary to identify the Feature Catalogue associated with each converted dataset into the encoding / S100_DatasetDiscoveryMetaData.	SPAWAR	
16	8.9	Sub-WG to be formed to consider the proposals relating to "Recommended Changes to S-100 Portrayal". Members: MS, HB, EK, HP, CM, HA, JLP, SO.	SPAWAR (lead)	
17	8.9	Supply MS Word version of S-100 Part 9 to SPAWAR (MS).	JW	Complete
18	8.10	For the next edition of S-100, replace the "ISO/IEC 8211 ASCII" and "ISO/IEC 8211 BINARY" in the S100_DataFormat table (Part 4a) with a single "ISO/IEC 8211" value. The sentence "For the encoding only the binary ISO/IEC 8211 format is used" must be removed from Part 10a-3.1.	IHO Sec	
19	9.3	Investigate how to implement the changes to the Registry as outlined in paper 9.3A.	JW/YB	
20	9.3	Liaise with OGC regarding RDF and the Semantic Web.	JP	
21	9.4	Develop draft guidelines for submission of proposals to the IHO GI Registry for Submitting Organizations, Domain Control Bodies and the Register Manager, for consideration of the S-100WG.	JW	
22	9.4	Develop ToRs for an IHO GI Registry Project Team for consideration of the S-100WG	JW	
23	9.5	Sub-WG to be formed to review the content of the IHO GI Registry. Members: JW, YB, CM, JLP.	JW (lead)	
24	9.6	Develop guidelines for the use of Codelist type attributes for inclusion in the IHO GI Registry proposal guidelines; and consider additional guidance for the S-100 document.	JW	
25	9.7	Conduct a review of S-99 and produce a new edition based on the accrued practical experience with the Registry and related decisions made at S-100WG2.	JW	
26	9.8A	Contact S-100WG Project Team leads to determine who will need access to the FCB.	Chair	

27	9.8A	Review the S-101FC Edition 0.9.0 and provide feedback to KHOA.	All	
28	9.8B	Produce a new edition of the S-101 DCEG taking into account the items reported in paper S-100WG2-9.8B. Once complete, produce an updated edition of the S-101 FC.	JW/KHOA	Complete (JW)
29	10.3	Review the draft Interoperability Catalogue model, schemas and a draft catalogues provided at the S-100WG2 meeting and report anomalies to EK.	All	
30	10.5	Establish a new online resource for making available and maintaining all S-100 based test resources including Test Data Sets and Catalogue files (including all historical versions).	Chair	
31	10.5	Review the draft Test Bed Framework document S-100WG2-10.5 and provide any feedback to the S-100WG Chair.	All	
32	10.6	Complete the Data Protection documentation for inclusion in S-100. (Finalise the specification – include guidance for implementers, and consider third part users. Provide further guidance on the use of the serial.txt and products.txt – taking into account the IMO requirement). Established a sub WG for this work. Members: CI, HP, SS, HB, LH.	JP (lead)	
33	10.7	Set up an online repository similar to the one established by IALA for reporting on S-100 based test bed projects.	Chair/IHO Sec.	
34	10.8	Draft S-100 Part 9B extension with specification for the Lua scripting proposal and investigate what text is generic to both XSLT and Lua.	SPAWAR	
35	10.8	Draft a new part for S-100 Lua Scripting; to support the development of Alarms and Indications, interoperability, and other script based extensions to the main functionality described in S-100.	SPAWAR	
36	10.10	Define the process of managing roles and feature associations to be used during the creation of a Feature Catalogue, and produce guidance on this process - to be included in S-99.	KHOA	
37	10.10	Include functionality for managing the creation of the roles and feature associations to be included in a Feature Catalogue in the next iteration of the S-100 FCB.	KHOA / IHO Sec.	
38	10.17	Include proposed test cases for the initial S-100 conversion tool in the test case document.	Chair	
39	11.1	Compile a clean Baseline DCEG Edition 0.0.2 document and post on the S-100WG page.	JW	Complete

40	11.2	Develop the documentation describing the Lua Portrayal Conditional Portrayal Procedures, for inclusion in S-100 and S-101.	SPAWAR	
41	11.3	Draft the necessary text to make provision for the generic (S-100 conformant) display of RADAR overlay information. This should include the addition of a RADAR_OVERLAY portrayal context parameter to the S-101 Portrayal Catalogue. (The portrayal rules will have to be modified accordingly).	SPAWAR	
42	11.3	When building the next iteration of the Portrayal Catalogue, take into account the need for a context parameter to handle over / under radar.	SPAWAR / KHOA	
43	11.4	Establish Sub-PT to develop S-101 validation checks. Members: CM, OF, NOAA (representative TBC), SevenCs (representative TBD), IC-ENC (representative TBD), JW.	RF (lead)	
44	11.5	Include additional guidance in the S-101 DCEG for the provision of information regarding the owners/operators of submarine cables.	JW	Complete
45	11.6	Draft a recommendation paper for the next meeting on file naming convention, taking into consideration problems associated with ENC Update Limitations (see paper S-100WG2-11.6).	KHOA / PRIMAR	
46	11.7	Establish a Sub-WG under the S-101PT to carry out a study and produce a guidance document on the "Improvement of ENC display on ECDIS". Members to be from NCWG, ENCWG and S-101WG Project Team. S-101PT Members: AU (representative TBC), FM, PP (TBC), OF, DG, HP, SS, RF, UKHO (representative TBC), CT, KI, FMK, LH, EK, GT, JV, MB, JW.	CM (lead)	
47	11.8	NATO GMWG to be invited to submit their proposals (A, B and C) to the Register manager.	JW	
48	11.8	Investigate the proposal to make Mooring Buoy a new feature (proposal D) thus allowing the attributes Buoy Shape, Colour and Colour Pattern to be removed from the Mooring Facility feature.	JW	
49	11.9	MS to review their ENC ancillary picture files and report whether they think that picture files are required in S-101. Report to the next S-100WG meeting.	All	
50	??	Submit a paper to the DQWG to discuss the definition of the enumerated values for attribute Quality of Horizontal Measurement.	CM	

**S100 Working Group 2 and S-101 Project Team 2
Genoa, Italy (15-18th March 2016)**

Agenda

Document Number Prefix	Agenda Item	Agenda Item / Document Title	
1. Opening and Administrative Arrangements			[Powell/Marchi]
S100WG02	01.1	List of Documents	
S100WG02	01.2	List of Participants	
2. Approval of Joint Agenda			[Powell]
S100WG02	02	Agenda	
3. Matters Arising			[Powell]
S100WG02	03.1	Minutes of S100WG1 and TSM4	
S100WG02	03.2	Status of Actions from S100WG1 and TSM4	
4. Matters Arising from HSSC-8 (Monaco) and IHA1 (Assembly)			[Powell]
S100WG02	04.1	HSSC Actions for S100WG	
S100WG02	04.2	Proposal 6 for the Assembly	
5. Reports of Activities of Other Working Groups			[Powell]
	05.1	NIPWG	[Marchi]
	05.2	NCWG	[Hovi]
	05.3	DQWG	□
	05.4	TWCWG	□
	05.5	ENCWG	[Mellor]
6. Activities of Other Organizations			[Powell]
	06.1	IALA	□
	06.2	ISO	[Pharoah]
	06.3	IEC	[Peiponen]
	06.4	WMO JCOMM ETMSS	[de Morais]
	06.5	DGIWG	□
	06.6	OGP	[Pharoah]
	06.7	GMWG (Geospatial Maritime Working Group)	□
	06.8	IMO - NCSR	□
7. S100WG Project Team Updates			[Powell]
	07.1	S-102 Update	[Brazier]
	07.2	S-121 Maritime Limits and Boundaries	□
	07.3	S-129 Underkeel Clearance Management	[Ward]
	07.4	S-101 ENC PS	[Refer to Agenda Item 11]
8. S-100 Proposals			
S100WG02	08.1	S-100 Edition 3.0.0 Status	[Powell]

S100WG02	08.2	Session Oriented Services	[Bolles]
S100WG02	08.3	IALA Unique Identifier Specification	[Sturla]
S100WG02	08.4	GeoPackage - OGC Specification for Data Encoding and Packaging	[Pharaoh]
S100WG02	08.5A	Producer and Agency Codes for S-100	[Pharaoh]
S100WG02	08.5B	PRIMAR View on Producer Codes	[PRIMAR]
S100WG02	08.7	General Data Model in S-100	[SPAWAR]
S100WG02	08.8	Changes to Support a Generic S100 Viewer	[SPAWAR]
S100WG02	08.9	Recommended Changes to S-100 Portrayal	[SPAWAR]
S100WG02	08.10	Removal of ISO 8211 ASCII Encoding	[SPAWAR]
S100WG02	08.11		
9. S-100 Infrastructure Updates			
S100WG02	09.1	NO PAPER Update on the S-100 Registry (FCD/Portrayal)	[Powell]
S100WG02	09.2	Current Status of the IHO Registry	[Wootton]
S100WG02	09.3A	Proposed Extension to the IHO Registry	[Pharaoh/Powell/Baek]
S100WG02	09.3B	Semantic Web Standards for S-100	[SHOM]
S100WG02	09.4	Registry Proposal Guidelines	[Wootton]
S100WG02	09.5	Review of IHO GI Registry Content	[Wootton]
S100WG02	09.6	Use of Codelists	[Wootton]
S100WG02	09.7	Impact of Changes on S-99	[Wootton]
S100WG02	09.8A	S-100 Feature Catalogue Builder	[Lee]
S100WG02	09.8B	S-100 Feature Catalogue Edition 0.9.0 (see also xml file)	[ROK]
S100WG02	09.9	NO PAPER S-100 Portrayal Catalogue Builder	[Powell]
10. General Topics			
S100WG02	10.1	Proposed Extensions to the IHO Registry	[See S100WG02-9.3A]
S100WG02	10.2	IHO Registry Management and Domain Control Bodies	[Powell]
S100WG02	10.3	S-100 Interoperability Specification	[Kuwalek]
S100WG02	10.4	S-100 Test Bed Update	[Powell]
S100WG02	10.5A	S-100 Test Bed Framework	[Powell]
S100WG02	10.5B	S-10X Test Bed Dataset and Test Site	[Baek]
S100WG02	10.6	S-100 Data Protection	[Pritchard]
S100WG02	10.7	Use of the IALA Reporting Guidelines for S-100 Test Beds	[Powell]
S100WG02	10.8	S-100 Portrayal Support of Lua	[SPAWAR]
S100WG02	10.9	SPAWAR S-100 Viewer Update	[SPAWAR]
S100WG02	10.10	Roles and relationships in the GI Registry and FCB	[Wootton]
S100WG02	10.11	Proposed S-102 Improvements	[PRIMAR]
S100WG02	10.12	Norwegian S-102 Testbed	[PRIMAR]
S100WG02	10.13	S-100 Exchange Catalogue Schema	[Malyankar/Powell]
S100WG02	10.14	KHOA S-100 Viewer Update	[Lee]
S100WG02	10.15	S-100 Sea trial (Gunsan and Busan)	[Lee]
S100WG02	10.16	S-128 Catalogues of Nautical Catalogues	[Lee]
S100WG02	10.17	Proposed Test Cases for the S100 Initial Data Conversion Tool	[TBD]

S100WG02	10.17	Cyber Security Issues	[Peiponen]
11. S-101 Project Team Topics			
S100WG02	11.1	Status of S-101 Documents and Resources	[Powell]
S100WG02	11.1A	S101 DCEG Status Paper	[Wootton]
S100WG02	11.1B	S101 DCEG 0.0.2 redline (Aug 2016)	[Wootton]
S100WG02	11.1C	S101 DCEG 0.0.2 redline (march 2017	[Wootton]
S100WG02	11.1D	S101 DCEG 0.0.2 (march 2017) clean	[Wootton]
S100WG02	11.1E	S101 DCEG Change Log	[Wootton]
S100WG02	11.2	S-101 Conditional Symbology Portrayal Way Forward	[Powell]
S100WG02	11.3	Generic S-101 Portrayal of Radar	[SPAWAR]
S100WG02	11.4	S-101 Validation – a way forward?	[Powell]
S100WG02	11.5	Proposal to Extend the S-101 Data Model	[Tirone]
S100WG02	11.6	ENC Update Limitations	[PRIMAR]
S100WG02	11.7	Improvement of ENC's display on ECDIS	[Mouden]
S100WG02	11.8	Proposals from NATO GMWG for S-101	[Pritchard]
S100WG02	11.9	Ancillary Files	[Pritchard]
S100WG02	11.10	Temporal Variation	[Meurink]
12. Any Other Business			[Powell]
13. Review of Meeting Actions			[Powell]
14. Date and Venue of Next Meeting			[Powell]
15. Close of Meeting			[Powell]

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Genoa, Italy (15 - 18 March 2017)

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11 MAY 2017

Subject: Minutes - S-102 Project Team Breakout Sessions (16 & 18 March, 2017).

Location: Grand Hotel Savoia, Genoa, Italy

1. **Executive Issues:**

- In conjunction with S-100 Working Group meetings the S-102 Project Team conducted multiple breakout sessions on 15 and 18 March, 2017.
- The project team focused on two topics:
 - S-102 Portrayal
 - Proposed S-102 improvements submitted by PRIMAR (S-100WG2-10.11).

2. **Attendees:**

16 March 2017:

- David W Brazier (United States)
- Janice Eisenberg (United States)
- Mikan Stamenkovich (United States)
- Patti Parkhouse (Canada)
- Jana Vetter (Germany)
- Christian Mouden (France)
- Svein Skjaeveland (PRIMAR)

18 March 2017

- David W Brazier (United States)
- Janice Eisenberg (United States)
- Mikan Stamenkovich (United States)
- Svein Skjaeveland (PRIMAR)
- Marc Roesbeke (Belgium)
- César Reinert Bulhões de Morais (Brazil)
- Holger Bothien (SevenCs)
- Edward Kuwalek (IIC)

3. **Background:**

- S-102 Version 1.0 was approved by IHO member states in April of 2012.
- Efforts to draft S-102 Version 2.0 have been ongoing since 2015.
- During the S-100 WG2 meeting the S-102 project team lead briefed a status update on S-102 version 2.0
 - Status Brief included conceptual portrayal options including automated sounding selection and contour generation.

4. **Meeting Minutes:**

a) **Breakout Session 1 (16 March 2017)**

- i. **S-102 Portrayal:** The project team discussed the conceptual portrayal options (contours and soundings) proposed during the S-102 Status Brief. The group acknowledged that that it was possible to automatically generate contours and soundings from the S-102 dataset, but were in full agreement that S-102 portrayal should focus solely on visualization of the gridded dataset. Generation and display of contours and soundings are not a desired capability for the following reasons:

- Impossible for the HO to validate platform derived contours and soundings.
- High legality concerns without the ability to validate.
- Several group members noted that is nothing stopping an HO from increasing contour density on the charting product.

Decision: *Modify S-102 Version 2.0, Clause 9.0 to focus solely on portrayal of the S-102 gridded dataset (Depth and Associated Uncertainty).*

- ii. **S-102 Dataset File Size:** The group briefly discussed concerns that the 10MB file size limit was too small. Multiple members stated that modern gridded surfaces are typically a few 100 MBs in size, with some files reaching 2GB.
 - PRIMAR suggested increasing the file size limit to at least 500MB.
 - Further discussion tabled until the 18 March Breakout session to obtain additional feedback from absent project team members.
- iii. **Topics Tabled for 18 March Meeting:**
 - Who has the authority to produce and S-102 surface?
 - How to handle file versioning?
 - Potential scientific use cases.

b) Breakout Session 2 (18 March 2017)

- i. **S-102 Product Specification Scope:** Prior to breakout session 2 the project team lead was provided valuable feedback from CARIS and CHS. CARIS noted that the S-102 spec lacked focus and was being pulled in multiple directions. In response to this observation the group revisited the scope of the project. Multiple use cases were identified:
 - Navigation
 - Precision navigation (bathy ENC)
 - Scientific
 - Fisheries
 - Dredging
 - Oil/gas infrastructure
 - Military
 - Protected areas

Decision: *Group members agreed that the S-102 Product Specification should focus primarily on Navigation use cases only. Scientific use cases, while valid, are not currently the focus of this product specification.*

- ii. **S-102 Portrayal:** As discussed during the first breakout session, the conceptual portrayal options briefed to the S-100WG scaled back. The group was in full agreement that S-102 portrayal should focus solely on visualization of the gridded dataset.

Decision: *Modify S-102 Version 2.0, Clause 9.0 to focus solely on portrayal of the S-102 gridded dataset (Depth and Associated Uncertainty). **ACTION: David Brazier***

- iii. **S-102 Portrayal Cont.:** During portrayal discussions Mr. Kuwalek noted that it was important to first verify that the S-100 specification contained the required information to support the portrayal of a gridded surface. Following a review of part 8 the group determined that the S-100 specification contained the required information to support the display of an S-102 surface.

Discussions then focused on what should be portrayed. The following talking points were discussed:

- Coverage fill options. Do we define a single coverage scheme, or should we also focus on the display of safe and unsafe waters.
 - *Future Question: Is there a way to trigger alarms from grid nodes?*
- Display of data quality. The group noted that there are multiple methods available to display data quality. At this time static visualization is the preferred method (text or colour based?). Once the group has successfully portrayed an S-102 surface additional effort can be focused on data quality.
- Need for vertical checks to ensure datum match between S-101 and S-102 products.

Decision: *US, Naval Oceanographic Office (NAVOCEANO) is going to develop a script to extract and replace BAG metadata with S-100 compliant metadata. This script will provide the capability to produce an actual S-102 file. NAVOCEANO intends to transfer this script to the IHO for distribution to member states. ACTION Stacy Johnson (NAVOCEANO).*

- **The remainder of the meeting focused on proposed S-102 improvements submitted by PRIMAR (S-100WG2-10.11).**
- iv. **S-102 Metadata:** Draft version 2.0 of the specification is currently aligned with “Redlined” S-100 version 3.0.
- The S-102PT Lead will review the current metadata requirements and determine whether all metadata is currently captured by BAG version 1.6.
 - Should any additional metadata need to be captured by BAG, Dave Brazier (NAVO) and Janice Eisenberg (NOAA) will liaise with the Open Navigation Surface Working Group (ONSWG) to determine whether additional fields may be added to the BAG specification.
- v. **S-102 Coordinate Systems:** PRIMAR noted that version 2 of the specification states that S-102 surfaces can be produced in any projected coordinate system. They expressed concern that having such a wide selection of coordinate systems would create unnecessary challenges for OEMs.

The group decided that a limited number of CRS should be allowed for S-102 datasets, with approved CRS's defined with ESPG code. The group also noted that there is a need to include projections commonly used for polar regions.

There should be included transformation parameters in metadata when necessary.

Decision/Action: *Modify Clause 5 and Annex A (Table A2) to support this decision.*

- vi. **S-102 New Edition Coverage:** The group discussed how to avoid confusion for end users when issuing new editions of S-102 data. PRIMAR proposed that new editions should cover the same area as the superseded edition.
- The group discussed the pros/cons of this suggestion and ultimately agreed that new editions should cover the same areas as the previous edition.
 - The group further discussed the need for a tiling scheme to help with dissemination. Multiple group members offered to investigate potential tiling schemes for S-102.
 1. Janice Eisenberg
 2. Svein Skjaeveland
 3. Marc Roesbeke

Note: If anyone else would like to participate with this effort please let me know.

- vii. **S-102 Cancel Cell Mechanisms:** The spec fails to discuss the potential reuse of cancelled datasets. There should be added a clause clarifying that the name of a cancelled dataset cannot be reused at a later stage

The group decided that edition versioning should be carried individually within every S-102 dataset as opposed to the S-102 exchange set. This will enable better compatibility with data handling and distribution services.

ACTION: Add following text in 11.2.1/11.2.2: Reuse of a cancelled datasets file name is prohibited.

ACTION: Review metadata to determine if additional fields are needed to capture S-102 versioning.

- viii. **S-102 File Name Suffix:** There was a lot discussion both in the S-100WG and the S-102PT on file naming. For the time being the group decided to stick with the current naming convention identified in the S-102 Specification.

- ix. **S-102 File Size:** Section 11.2.1.1 Dataset Size (Draft version 2.0) identifies two file sizes: 1) 10MB limit for transmission of S-102 data, and 2) 256MB for physical media transfer.

As covered from the first breakout session, group members expressed concerns that the 10MB and 256MB file sizes were too small. Multiple members stated that modern gridded surfaces are typically a few 100 MBs in size, with some files reaching 2GB.

Without an actual S-102 dataset to test with group members agreed to work on defining minimum “suggested” grid sizes for each display scale identified in Table 3.1 of the Draft Version 2.0 Specification. This effort will be coupled with the effort to develop a tiling scheme to reduce file sizes.

Group members supporting this effort:

1. Janice Eisenberg
2. Svein Skjaeveland
3. Marc Roesbeke

Note: If anyone else would like to participate with this effort please let me know.

- x. **S-102 Safety of Navigation:** The group discussed the various gridding methods utilized by HO's in support chart production and whether all gridding methods are valid for S-102 production. After some discussion members agreed that S-102 producers should keep safety of navigation in mind when creating an S-102 datasets, but they should not be restricted by the specification to specific gridding algorithms.
- xi. **S-102 Display and Portrayal:** The project team determined that two portrayal schemes should be defined:
 - A colour ramp for replacing skin of the earth features.
 - A two-colour scheme depicting safe/unsafe waters based on mariner provided context parameters.

Future discussions on interaction between S-102 and S-101/other S-100 data will take place during the S-100 interoperability analysis.

- xii. **S-102 Digital Signature:** IHO Data Protection Scheme Working Group (now a Project Team under S-100WG) will define a data protection scheme for S-100 products. The project team decided to align the development of the PS data protection part with the ongoing data protection work being carried out for S-100. In that way S-102 2.0.0 will be proof of S-100 data protection scheme.
- xiii. **Submission to HSSC:** The group decided to postpone submission of S-102 Version 2.0 until HSSC9 (June 2018). This decision was discussed verbally with S-100WG chair and provides an additional 6 months to complete portrayal.

5. **Actions:**

- Modify S-102 Version 2.0, Clause 9.0, removing automated sounding selection and contour generation. (David Brazier, NAVOCEANO) – April 30, 2017.
- Develop a script to extract and replace BAG metadata with S-100 compliant metadata to produce an S-102 file. (Stacy Johnson, NAVOCEANO) – June 30, 2017.
- Modify Clause 5 and Annex A (Table A2), defining approved Coordinate Reference Systems (David Brazier, NAVOCEANO) – April 30, 2017.
- Add following text in 11.2.1/11.2.2: Reuse of a cancelled datasets file name is prohibited.
- Review metadata to determine if additional fields are needed to capture S-102 versioning. Provide feedback to the project team for review. (David Brazier, NAVOCEANO and Janice Eisenberg, NOAA) – May 31, 2017.

- Based on results from metadata review, liaise with the Open Navigation Surface Working Group (ONSWG) to determine whether additional fields may be added to the BAG specification. Work with ONSWG to better align BAG and S-100 metadata where possible (David Brazier/Stacy Johnson, NAVOCEANO and Janice Eisenberg, NOAA) – Aug 30, 2017.
- Define minimum “suggested” grid sizes for each display scale identified in Table 3.1 of the Draft Version 2.0 Specification (Janice Eisenberg, Skjaeveland, Roesbeke) – Aug 30, 2017
- Investigate potential tiling schemes for S-102 datasets. Provide feedback to the project team (Janice Eisenberg, Skjaeveland, Roesbeke) - Aug 30, 2017.