

7th Meeting of the Data Quality Working Group (DQWG)
University of New Brunswick, Fredericton, NB, Canada, 16-18 July 2013

Report

Item 1 - Opening and Administrative Arrangements

Welcome by Marcello Santos, Head of Geodesy and geometrics engineering department. Lunch and refreshments were kindly provided by the department.

The participants were invited by HydroMetrica Limited for Tuesday dinner.

The participants were invited by CARIS for Wednesday for a barbecue social.

Regrets by Weronika SOCHA (Fuguro) and Russian Delegate due to visa issues.

Welcome by working group chair Chris Howlett (CH), who thanked Dave Wells and the UNB for hosting the meeting.

Item 2 - Approval of Agenda

Agenda (DQWG7-02A) was reviewed with minor changes, followed by introductions by participants.

Item 3 - Acceptance of DQWG-6 Minutes and Review of Outstanding Items

Eivind Mong (EM) presented minutes from DQWG6. Minutes accepted without comment.

EM went through outstanding actions where the actions reviewed and status table updated (See Annex A).

A group photo was taken, and will be posted on the IHO website by Michel Huet (MH).

Item 4 - Evaluation of Events since DQWG-6

4.1 Papers to HSSC - DQWG report to HSSC-4 was approved. However, paper on “Mobile areas and areas affected by extreme events” met some opposition. The proposal for areas of mobile seafloor was not approved, but the proposal for areas affected by extreme events was accepted.

4.2 Paper to Hydro12 (DQWG7-04.2A, 04.2B and 04.2C) – Samuel Harper (SH) said that DQWG tries to be as open as possible to discuss the issues being faced. He also said that the users of ENC will become more and more non-traditional as ENC is being used in other than ECDIS uses, such as spatial data planning. SH paper at Hydro12 was at the end of a session, and a following DQWG ad-hoc meeting was held with about 30 participants. The IHB President, Robert Ward, was in attendance. He stated that in the past when the CATZOC was constructed, there was an attempt at creating a similar algorithm to the one DQWG is currently attempting, but that due to S-57 limitations it was abandoned for the current table form. However, in the S-100 environment there may be enough flexibility to succeed. There was some concern on the changes introduced by a “new direction”, so DQWG need to keep in mind the

impact of change. The ad hoc meeting was considered successful and SH recommended that anyone presenting papers should consider a similar ad hoc meeting to allow those who may otherwise not be able to participate at DQWG meetings, a chance to comment.

4.3 Paper to USHydro 2013 – Report on feedback Kandice poster will be discussed during item 5.

4.4 Paper to MARID2013 (DQWG7-04.4A) – Leendert Dorst (LD) attended to give a paper on sand waves. Results from discussions are fed into his paper under DQWG7-10.2A.

4.5 Article in Soundings – authored by CH and LD, focusing on user’s perception on the effect of data quality on the use of data. No feedback received so far. CH was waiting to hear back from Soundings editor to find out if the article can be distributed.

4.6 TSMAD26 outcomes (DQWG7-04.6A and 04.6B) – DCEG sub group feedback; Sean Legeer (SL) presented the paper from the working group to request clarifications. Meeting reviewed the comments and SL captured the specific actions related to the paper.

Action DQWG7-4.6A: SL to revise the data quality parts of the DCEG and distribute to DQWG for comment, before sending back to TSMAD-DCEG subgroup.

Action DQWG7-4.6B: CH to report the concerns over the concept of a feature being mandatory at a larger scale but not in a smaller scale (scale dependent mandation, e.g. CATZOC mandatory at larger scales), to TSMAD.

Action DQWG7-4.6C: Mike Prince (MP) to propose a revision to the enumerated lists of QUAPOS and QUASOU, which reduce the number of similar items to the bare minimum. Proposal will be circulated to DQWG for comment, and then submitted to TSMAD-DCEG by SL.

Paper 04.6B bullet: “TECSOU must not be used on a **M_QUAL** object to specify a lower quality than the **CATZOC** category indicates.” Seems unpolicable. It was suggested removing the bullet. 2nd bullet was also recommended to be removed as TECSOU does not impact portrayal and give minimal valuable information to the end user. Furthermore, DQWG recommended amending S-58 test 1531 by removing TECSOU.

Action DQWG7-4.6D: EM to report the outcome of paper 4.6B discussion to TSMAD before UOC comment deadline (Aug 9, 2013).

4.7 – Data quality in nautical publications (DQWG7-04.7A)

EM presented a paper on updates of how SNPWG see data quality in nautical publications.

DQWG disagreed with the suggested addition of attributes to Category of temporal variation because these were reasons for the change and not in the spirit of the definition of the attribute. It was considered a better option that the textual description or information attributes be used to carry this information.

DQWG agreed with the other added attributes and considered them useful. DQWG invited SNPWG to revise the DQWG data model to reflect the changes needed so as to try and avoid dialects of the same data quality model. It was recognised that hierarchical level and scope may also be useful for bathymetric data quality. EM to liaise with SNPWG on these changes to ensure any changes to the data model introduced by the sub group is communicated to SNPWG.

Action DQWG7-4.7: EM to report on any progress made by SNPWG on the data quality model at DQWG8

Item 5 - Review Data Quality Portrayal Proposals submitted by USM (DQWG7-05A)

Dave Wells (DW) presented the Stage 1 work of USM on data quality indicators. The USM team had assistance from NOAA which provided an attributed ENC, as well as CARIS and utilised their ENC Composer tool to generate views of the data quality using the red-yellow-green approach. The team was not able to progress as far as envisioned due to restricted access to needed resources, and still have some ways to go. The work was presented at USHydro2013, and detailed feedback from two experienced mariners was received.

CH thanked Kandice Gunning for her efforts in putting together the analysis of data quality visualization using composite attributes.

The group reviewed and discussed the feedback, and took particular note of the comment regarding the need for easy access (on/off) to the data quality for a mariner to obtain the information in a timely manner during an emergency. The discussion also shows there are several types of users, and that should be kept in mind so that DQWG does not focus too much on one type.

The group felt that additional surveys may be difficult, and rather the quest for feedback should be sought at mariner conferences. A suggestion has been to create test cases based on past accidents.

Action DQWG7-5: All to collect examples of past accidents and incidents, and send to LD, who will combine all to a list for future use as examples to run tests against.

Item 6 - The group carried on discussions from Item 5 on portrayal of data quality by reviewing the 12 axioms from DQWG6. There were several modifications (highlighted in yellow) and 3 axioms were removed. These are the revised axioms:

“Our proposals are based on the following perceived axioms (self-evident truths). These are presented intentionally to spark discussion, and not as final axioms.

1 - The purpose of nautical charts is to *facilitate informed decision-making* by mariners and other chart users.

2 - Portrayal of chart quality indicators are **most likely to be used** during voyage planning, less **frequently** during voyage monitoring, but may also be important during emergencies. Emergency use may raise **issues concerning** appropriate **display methods providing prompt access**.

3 - It is NOT the purpose of charts and ancillary information complementing charts to replace the mariners and

other end users as decision-makers. Information provided with charts should NOT extend into decision-making.

- 4 - Component quality indicators, whose meaning is transparent to end-users, effectively facilitate informed decision-making.
- 5 - The three **types of** quality components identified in Dorst & Howlett (*measurement uncertainty; completeness; currency*) represent a good starting point in defining indicators that are useful, intuitive, "mariner-friendly", that is have a *transparent meaning to mariners*.
- 6 - However the assumption built into the above statement must be tested by eliciting feedback from mariners on the use of these **types of** quality components, sooner rather than later.
- 7 - In general, composite indicators on their own, such as CATZOC, or a replacement for CATZOC, risk incorporating a priori decision-making, which is inappropriate, and has an opaque meaning to end users. It may be that mariners will find a composite indicator useful, **but to maintain transparency this should be accompanied by its component indicators. But this should be tested with regular mariner feedback.**
- 8 - Past efforts to represent chart quality, whether by source diagrams or CATZOC encodings, represent chart quality in ways that may be useful to a hydrographer, but, as indicated by the DQWG survey results, do not address **all** the needs of, nor are easily interpreted by, a mariner.
- 9 - Development of a composite algorithm that combines not only chart quality attributes but also environmental and ship factors as well, goes well beyond the chart quality mandate of the DQWG; will inevitably be complex; and risks being even more opaque to mariners."

Brian Calder (BC) – presented his ideas for how to visualize uncertainty. He showed that under keel clearance is an important factor of the visualization of risk, as the same bit of bathymetry will have different risk depending on the draught of the vessel. He also stated that the less dense data complicates the visualization of risk and reduces the possibility to provide accurate information to the user. BC is in the process of publishing his work, and therefore the details were not distributed among DQWG members as of yet.

SH – presented his paper on the combination and hierarchy of data quality indicators. SH explored the possibility to use a hierarchy of components to arrive at a quality indicator. The focus of his exploration was bathymetric. The ensuing discussion showed that there also need to be consideration for legacy data.

LD – presented his paper on how to build a display algorithm for a hierarchy of data quality indicators. Including in his paper was an analysis of how the method BC presented match.

During discussion of the impressions of the three paper inputs, it was agreed that the visualization of data quality should be four categories (good quality, moderate quality, poor quality, unknown). Ship draft will be included as a selection attribute for areas where there are stacked QualityOfBathymetricData areas using the DRVAL1 and DRVAL2 attributes. In such areas the lowest quality instance will be the default in case the ship draft is unavailable.

A sub group was formed to further develop the hierarchy approach. The group consist of Sam Harper, Antti Castren, Karen Cove (KC), Mike Prince, Eivind Mong. Group leader is Mike Prince. Deadline for the first draft is end of September 2013. Final result is to be presented to TSMAD28/DIPWG6 in March 2014.

Action **DQWG7-6A**: sub group to develop the hierarchy and the algorithm that drive the data quality display.

Action **DQWG7-6B**: EM to present a progress report on the development of the hierarchy and algorithm to TSMAD27

See Annex B for sub group meeting output.

Item 7 - Discuss the Potential Role of Scale in Data Quality Algorithms (DQWG7-07A and 07B)

The group reviewed the paper presented by LD and the comments received from Jeff Wootton (JW). After discussion, it was concluded that for practical reasons, the effect of generalization should not be included in bathymetric data quality. No consensus was reached with regards to non bathymetric data quality.

Action DQWG7-7: All to consider the merit of including the impact of generalization on quality of non bathymetric data as raised in paper DQWG7-07A and report back at next meeting.

Item 8 - ISO19115/19157 Review (Actions DQWG6-9A/B/C)

EM briefly described the ISO documents and how TSMAD used them to create S-100. There is a work item for DQWG to improve the data quality part of S-100 (Part 4c) and for that work DQWG membership need to be familiar with ISO 19115 and ISO 19157.

TSMAD has said they will assist DQWG in the work to revise S-100. EM explained that DQWG is not restricted to 19115 and 19157, but that a profile will be made, where the useful parts of the ISO documents will be used, and additions and extensions will be used to fill the “gaps”.

ISO 19157 has not yet been published, and is currently at the FDIS stage. There should not be substantial changes between FDIS and published stage, therefore the FDIS document can be used to start the review; it will be later replaced by the final published version.

Action DQWG7-8: extend action 6-9a to include ISO 19115.

Kenneth Gustafsson (KG) distributed the ISO 19157 FDIS document to DQWG membership.

Item 9 - Education on Data Quality

Mariners: DQWG found that it has been more difficult to reach the mariners that originally envisioned. The Mariners Workshop held in Canada annually is one venue where DQWG can discuss issues of data quality. Newsmedia is proposed as another venue.

The meeting discussed background material that can be used for education on data quality; the Danish Hydrographic Office's publication "behind the nautical chart" (free)¹ was mentioned, as well as the UKHO's training course on nautical charts (not free). The Australian Hydrographic Office also has a publication available on their website (free)². CH suggested that DQWG form a repository of material that can be used when someone has a speaking engagement.

Action DQWG7-9A: SH and CH will put together a presentation for Southampton Digital Hydrography and the Maritime Web Conference (end of October). KC (EM backup) may re-use the presentation at the Mariners Workshop (February 2014). The e-Navigation workshop in Seattle may be another venue where the presentation can be used.

Action DQWG7-9B: LD to submit an article on data quality for the eNav International.

The meeting discussed how best to deal with the IMO model course, and it was suggested that the proposal made to HSSC-4 be revised to not suggest the formation of a new working group, but rather focus on the IHO making material that can be used by training institutions. SH suggested that DQWG can draft the data quality material as the working group is now larger and have more resources.

Action HSSC4-30 placed on DQWG requires the working group to review HO material on data quality and assess its adequacy.

Action DQWG7-9C: CH to draft a circular letter requesting any existing training materials relating to data quality, that DQWG can review.

DQWG has, thus far, focused on education of mariners; however, the working group is also tasked with educating cartographers. CH suggested that the documents being compiled for mariners can also help cartographers. LD stated that the work done already by DQWG has in fact been aimed on cartographers. For example the TSMAD23-4.5.13 document, which proposed the data quality model, was used by the TSMAD-DCEG subgroup to formulate the S-101 DCEG, which will be used by cartographers.

Item 10 - Standardise Use of CATZOC (Action DQWG4-5A)

10.1 Potential further clarification to CATZOC wording for Single Beam and Side Scan surveys in relation to CATZOC A2 status – DQWG discussed the usefulness of a list of techniques of sounding measurement and what CATZOC categories can be achieved with those techniques. The discussion concluded that it is how the techniques were used that is the most important factor, and therefore such a list would not provide great value. There was agreement that the idea should be abandoned.

10.2 Potential improved proposal for CATZOC in relation to a mobile seafloor (DQWG7-10.2A and 10.2B) – LD presented his paper on areas of mobile seafloor and how to connect CATZOC to them. He

¹ <http://www.gst.dk/NR/rdonlyres/91757A2A-8433-44FF-ABBD-A268864B46AF/0/BehindNauticalChartversJun2013.pdf>

² http://www.hydro.gov.au/factsheets/WFS_Accuracy_And_Reliability_Of_Charts.pdf

stated that for political reasons, it is often difficult for a hydrographic office to have lower CATZOC values than their neighbours. Therefore he sees great value in having the separation of quality of survey and quality of bathymetric data, which enables the HO to show they have done excellent surveys, but that there are areas where nature change the seafloor so frequently that soon after the survey, the data could be obsolete. The paper received comments from Jeff Wootton of AHS which were reviewed by the meeting. The meeting found the proposed guidance of how to link various events to a CATZOC value, of great use and it was therefore suggested that the list be added to the UOC. EM informed the meeting that a new version of the UOC is in the works and that DQWG should endeavour to get the guidance included into the upcoming version.

Action DQWG7-10: LD and SL to submit a proposal to Jeff Wootton, for adding the guidance to the draft UOC 4.0 as well as review, and comment if needed, the added bullet on extreme events by Aug 9, 2013.

Item 11 - DQWG work plan review

The work plan was reviewed and the following amendments were agreed upon.

A Review ISO 19113, 19114, 19115 and 19157 and make recommendations for inclusion in S-100 – no change.

B.3 Draft S-101 data quality - change to complete – there were no amendments discovered.

Add B.4 - Develop the hierarchy approach by formalizing the hierarchy and the algorithm that drive the display. Priority: high. Milestone: TSMAD27 update report. End date 2014. Ongoing. Contact person: Mike Prince. Related project: S-101. This is to be completed for submission to TSMAD28.

C.4 Investigate possible methods for how to educate practicing mariners on data quality issues – Change next milestone to DQWG8. Add under remark: IHO CL to be issued on this topic.

E.1 Develop logic tree for alarms in current and proposed approaches – Change to “Develop logic for indications in current and proposed approaches”. Change milestone to DQWG8. End date 2014. Ongoing. Contact person: Mike Prince. Related project: S-101. This is to be completed for submission to TSMAD28.

E.2 Demonstrate methods to mariners – Change: next milestone to “follow S-100 demonstrator”. Contact person: DQWG. Related project: S-101.

F.1 Investigate areas of quality concern (other than survey / bathymetry) – Add milestone: DQWG8. Change remark to: SNPWG has responded, liaison is ongoing.

H.1 – Add work item; “Establish contact with other working groups to investigate scope of data quality items for the S-10x standards (e.g. TSMAD for S-102)”. Planned item.

Change item I to only say “Conduct the 2014 meeting of DQWG”

Action: CH to update the work plan according to the above changes.

Item 12 – Tidy up Outstanding Actions prior to HSSC-5

HSSC actions had been reviewed during the course of the meeting.

Item 13 – Membership

MH will update membership list to include Mike Prince for Australia.

SL will confirm if Shep Smith wishes to remain as a member.

LD to provide MH with contact details of Dutch contact.

Item 14 - any other business.

None were brought forth.

Item 15 – Actions were reviewed (Annex A).

Item 16 – Date and place for next meeting.

Tentatively proposed to be in 2014, during the week before TSMAD/DIPWG in Wollongong.

CH thanked Dave Wells and the UNB for hosting the meeting. He also thanked Dave and CARIS for hosting dinner on Tuesday and Wednesday.

Meeting closed at 15:50.

Annex A – Status of Actions

Action ID	Action	Status
DQWG3-8A:	<i>Education of mariners and cartographers</i> ; CH has started preliminary discussions with UK maritime colleges. Work continues as the S-101 ENC Prod Spec is evolving. UKHO is working on a course for mariners in the use of ENC. CH will try to make contact with IAIN – International Association of Institutes of Navigation (www.IAIN.org). Dave Wells will contact Egyptian contact to see if IAIN can become involved in the work.	Dave contacted his Egyptian contact and forwarded that contact to Chris. The Egyptian contact has arranged a conference, but due to poor overlap with DQWG CH did not attend the meeting. UKHO is offering a course for navigators. Review again under DQWG agenda item 9 and decide on a way forward. Ongoing.
DQWG4-3A:	<i>Display of quality indicators</i> ; USM is involved, deadlines to be discussed during agenda item 8.	Ongoing
DQWG4-5A:	<i>Amending UOC §2.2 on the use of M_QUAL and CATZOC</i> ; CH to draft paper to be submitted to HSSC.	Paper was put forward to HSSC, but not accepted. DQWG7 will discuss further. UOC 4.0 draft has some items that overlap. Will be reviewed during the DQWG7 discussions.
DQWG4-5D:	<i>Dissemination of data quality knowledge to practicing mariners</i> ; Progress report to be put together by Samuel Harper (SH) for the S-64 meeting in London, October. Key findings were distributed via IHO CL 58/2012.	SH received advice that the London meeting was not a good match for further discussion. Closed.
DQWG4-9A:	<i>DQWG Membership</i> ; Google group has many limitations due to office e-mail restrictions. Therefore Google group will be discontinued and the IHB will keep a master list of DQWG membership. CH will send a shut down message.	Message sent, closed.
DQWG5-1A:	<i>IMO ECDIS Model Course</i> ; CH & SH to draft paper to be submitted to HSSC. As a follow up to action DQWG5-1A: IMO ECDIS Model Course ; DQWG6 decided to review IMO ECDIS model course. Upon review DQWG6 noted the data quality included in the model course is very high level. DQWG felt that the IMO model course is an outline targeted on training institutes and therefore the effort of IHO should not be on changing the model course, but rather for HSSC to task the working groups or a new working group to draft IHO input for training institutes. Draft prepared by CH and SH of DQWG submission to HSSC on a proposal to set up a new working group to develop IHO input to the IMO ECDIS model course was reviewed and approved. Further to Action DQWG5-1A : CH and SH to liaise	Paper was submitted to HSSC4. The IHO does not wish that a new working group be set up. An action was put on DQWG to review the adequacy of HO publications. Closed.

	with HSSC on the item.	
DQWG5-4B:	<i>Existence Doubtful (ED)</i> ; CH discussed with Andrew Heath-Coleman. CSPCWG to discuss and CH will follow up with Chris Jones.	CH discussed with Andrew Heath-Coleman, CSPCWG still find ED useful. DQWG will continue to liaison with TWLWG. Closed.
DQWG6-5A:	CH to inform the DIPWG chair of the DQWG intentions.	Ongoing.
DQWG6-5B	SH and EM will produce first draft portrayal, and further input may be gained from the USM work.	Ongoing: USM input at DQWG, DIPWG is drafting S-52 Presentation Library 4.0 and TSMAD is drafting S-100 Part 9 – Portrayal.
DQWG6-6A:	EM to update mapping between M_QUAL and bathymetric quality and distribute to group. DQWG to review and comment by end of September.	Done, distributed Aug 15, 2012. Group provided feedback which was incorporated.
DQWG6-6B:	EM to distribute updated data quality model to group. DQWG to review and comment by end of September.	Done, distributed Aug 15, 2012. Group provided feedback which was incorporated.
DQWG6-6C:	CH will write the table of the mapping of M_SREL and QualityOfSurvey.	Done, e-mail from Chris on August 24 th , 2012.
DQWG6-6D	SH to capture the drawing from the discussion and write up further instructions of the use of the proposed features and attributes.	Ongoing, portrayal architecture reveal that the level of granularity provided may not be needed. To be discussed further under DQWG7 item 6.
DQWG6-8A	DW to progress the investigation into visualization of data quality.	Ongoing, USM report under DQWG7 item 5.
DQWG6-9A	DQWG membership to become more familiar with the ISO documents, with particular focus on ISO 19115 and ISO 19157, by DQWG8	Ongoing: ISO 19157 is at FDIS stage. EM will announce to the group when standard is published.
DQWG6-9B	CH to discuss assistance from TSMAD in developing the improvements to S-100 and the S-101 Data quality model.	CH has discussed with TSMAD chair. They are willing to assist, but requesting guidance on specifics. Closed.
DQWG6-9C	DW to distribute the ISBN number of an introduction document to TC211.	Done
DQWG6-10A	CH to respond to Japan with the recommendation of DQWG to their paper.	Done
DQWG6-10B	<i>SNPWG on data quality</i> : EM to liaise with SNPWG on data quality.	Ongoing, SNPWG paper for DQWG7.
DQWG6-10C	SH and LD to organize open ad-hoc meeting during Hydro12.	Done, LD distributed minutes from meeting. Further discussions during DQWG7.
DQWG6-13A	<i>Review of DQWG work programme</i> : CH to update work programme.	Done and submitted to HSSC4

DQWG7-4.6A	SL to revise the data quality parts of the DCEG and distribute to DQWG for comment, before sending back to TSMAD-DCEG subgroup.	
DQWG7-4.6B	CH to report the concerns over the concept of a feature being mandatory at a larger scale but not in a smaller scale (scale dependent mandation, e.g. CATZOC mandatory at larger scales), to TSMAD.	
DQWG7-4.6C	MP to propose a revision to the enumerated lists of QUAPOS and QUASOU, which reduce the number of similar items to the bare minimum. Proposal will be circulated to DQWG for comment, and then submitted to TSMAD-DCEG by SL.	
DQWG7-4.6D	EM to report the outcome of paper DQWG7-04.6B discussion to TSMAD before UOC comment deadline (Aug 9, 2013).	
DQWG7-4.7	EM to report on any progress made by SNPWG on the data quality model at DQWG8	
DQWG7-5	All to collect examples of past accidents and incidents, and send to LD, who will combine all to a list for future use as examples to run tests against.	
DQWG7-6A	HICUP sub group to develop the hierarchy and the algorithm that drive the data quality display.	
DQWG7-6B	EM to present a progress report on the development of the hierarchy and algorithm to TSMAD27	
DQWG7-7	All to consider the merit of including the impact of generalization on quality of non bathymetric data as raised in paper DQWG7-07A and report back at next meeting.	
DQWG7-8	Extend action 6-9A to include ISO 19115.	Done
DQWG7-9A	SH and CH will put together a presentation for Southampton Digital Hydrography and the Maritime Web Conference (end of October). KC (EM backup) may re-use the presentation at the Mariners Workshop (February 2014). The e-Navigation workshop in Seattle may be another	

	venue where the presentation can be used.	
DQWG7-9B	LD to submit an article on data quality for the eNav International.	
DQWG7-9C	CH to draft a circular letter requesting any existing training materials relating to data quality, that DQWG can review.	
DQWG7-10	LD and SL to submit a proposal to Jeff Wootton, for adding the guidance to the draft UOC 4.0 as well as review, and comment if needed, the added bullet on extreme events by Aug 9, 2013.	

Annex B – HICUP Meeting notes

Meeting notes July 19, 2013 - Fredericton, NB, Canada

First meeting of the HICUP sub-working group (Hierarchical Indication of Composite Uncertainty Propagation)

Stated Task from DQWG: To be updated based on DQWG 7 meeting minutes

Participants: Mike Prince (chair), Sam Harper, Eivind Mong, Karen Cove, Antti Castren

Action: All to start compiling scenarios to test the composite algorithm against and send to the group. Karen to compile into a table.

Action: Sam to distribute Leenders input on the hierarchy.

Action: Antti to mock up his hierarchy ideas and send around to group.

Action: Once hierarchy has stabilized, Eivind will model in UML.

Notes

- May be appropriate to rely heavily on S-44 to come up with constituent elements for seafloor coverage, bathymetric quality, ..
- How will S-44 content be described in context of the new component quality indicator?
- What language from S-44 will be used in the definition of the constituent elements and the component quality indicator?