

11th CHRIS MEETING
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**S-57 and DIGEST in the context of International Standards Development for
Geographic Information**

"The IHO's Transfer Standard for Digital Hydrographic Data (S-57) has taken over a decade to develop and is only now starting to be used at a production level.

During the S-57 development phase, much has happened in the area of standards development for geomatics and spatially referenced data. Where as it may be argued that the S-57 and DIGEST standards should be considered as "international" by virtue of the bodies that developed them, this may no longer be true, when considering the enormous amount of work that has been carried out by other international standards forming bodies.

Who are these standards forming bodies and what are they doing?

The International Organization for Standards (ISO) is a non-governmental international standards organization comprising a world wide federation of national standards bodies from approximately 130 countries.

Its mission is to promote the development of standards with a view to facilitate the international exchange of goods services, and to develop cooperation in areas of intellectual, scientific, technological and economic activities. Only one member body from each country may be admitted to membership of ISO and assumes responsibility for representing the interests of that country. Member bodies are entitled to participate and exercise full voting rights on any technical or policy committee of the ISO and should they decide to take an active part in the work of a technical committee or sub-committee, they are designated as P (Participating) members. Provision has also made for organizations to participate as L (liaison) members. Both the IHO and DGIWG are type A - liaison member and may participate in Technical Committees and Sub-Committees but do not have voting rights.

In response to a growing demand for Geographic Information and a need for standards in this area; the ISO established in April 1994 the Technical Committee 211 (ISO/TC211).

The standards developed by ISO/TC211 are encompassed in the ISO 15046 documents which comprises a family of publications that can be divided into the following groups:

Framework and Reference Model	(15046 Part 1 - Part 5)
Profiles and Functional Standards	(15046 Part 6)
Data Models and Operators	(15046 Part 7 - Part 9)
Data Administration	(15046 Part 10 - Part 15)
Geographic Information Services	(15046 Part 16 - Part 19)

The European Standards Organization's Technical Committee (CEN TC 287) has also been producing Standards for Geographic Information and works in cooperation with ISO/TC211. For many years, the European Committee for Standardization (CEN) played a low key role in standards development, and it was generally perceived that the ISO Standards would serve this purpose within Europe. The decision, however, in the late 80's and early 90's by the European Community to create a single European Market based on Community-wide legislation and supported by standards, developed by European standards bodies changed this perception. The so-called "New Approach Directives" in Europe, resulted in a large expansion of the European standardization activity and in many cases, caused ISO activities in some groups to come to a standstill. Fortunately, an agreement was reached (The Vienna Agreement) on technical cooperation between ISO and CEN, which now enables both organizations to benefit from the results of the standardization work at the international and European levels. The agreement now also provided a mechanism for ISO's non-European members to influence European Standards. Both the ISO/TC211 and CEN/TC287 are cooperating in various areas of work with the common goal of achieving harmonized standards.

The International Electrotechnical Commission (IEC) is the international standards and conformity assessment body for all fields of electrotechnology. It publishes international standards for all electrical, electronic and related technologies.

The IEC has more than 50 participating countries. Its mission is to promote, through its members, international cooperation on all questions of electrotechnical standardization and related matters, such as the assessment of conformity to standards, for which it publishes International Standards. As a result of IMO Resolution A.817 adopting the Performance Standards for ECDIS, the IEC were task to provide a set of test criteria against which ECDIS systems could be evaluated for conformance. This task resulted in the publication of IEC Document 61174 - "Electronic Chart Display and Information Systems (ECDIS) - Operational and Performance Requirements, Methods of Testing and Required Test Results".

IEC 61174 provide type approval authorities with a base document that, can be used for evaluating testing and certifying manufacturers ECDIS systems. ECDIS type approval is a requirement for attaining paper chart equivalency when used in conjunction with "official" ENC's.

The Open GIS Consortium (OGC) is a non-profit, open international consortium of more that 100 corporations, government agencies, non-government organizations and universities. It coordinates the collaborative development and marketing of open geoprocessing services and technologies. The OGC is also an ISO Class A liaison member of ISO, and has recently established a cooperative agreement with the ISO/TC211. OGC operates through a consensus process, and since most its members are users or vendors of GIS technology, progress is usually very rapid. OGC should be seen as providing a valuable contribution to the ISO/TC211 standardization process.

In light of the above, it should be evident that both the IHO and DGWIG can not continue further development or harmonization in isolation of these international collaborative standards forming efforts. The question must be asked whether TSMAD considers that, future harmonization and development of S-57, should be progressed on a technical level within the context of the efforts of ISO/TC211.

Present Status of S-57 / DIGEST Harmonization

In the early developmental stages, it was considered that the purposes for which S-57 and DIGEST were to be used were quite different, and there was little need for harmonization. It soon became evident however, that there were many similarities at the component level and there could have been a far greater degree of cooperation on issues such as the developing a common data model, harmonized feature/object

catalogues, common list of geodetic codes, harmonized update methods and harmonized meta-data. It was also realized that harmonization would benefit NATO naval vessels who had a requirement for ENC's conforming to IMO requirements as well as the broad spectrum of DIGEST products for joint operational activities.

In 1994 a joint IHO / DGWIG Harmonization Working Group (HWG) was established to determine areas of compatibility between the two standards. After a lengthy and detailed comparative study, Version 1 of the Interface Control Document (ICD) was released in January 1996. The second version was released in September 1997. The purpose of the ICD was to provide a comparison between the two standards in order to determine areas of potential harmonization with a view to the translation of data and products between them.

On completion of Version 2, the HWG stated that no further versions of the ICD would be produced. At the next HWG meeting, which took place in Oxford (September 1997), DGWIG proposed that the joint IHO / DGWIG Harmonizing Work Group should be closed, and any further harmonization should continue under ISO/TC211. As WG5 has "Functional Standards" as one of its work items, it was decided to create a sub-working group 5.1 dealing specifically with DIGEST/S-57 harmonization. (As both IHO and DGWIG are Class A liaison members of the ISO, they may participate in the activities of the ISO Technical Committees, but do not have voting privileges).

The 9th CHRIS meeting (12-14 November 1997 Monaco) approved this move however it was stated that "any changes (to S-57) be made as recommendations to TSMAD for consideration".

At the 10th CHRIS meeting, (30-31 October 1998 Singapore) it was reported that the IHO/DGWIG Harmonization Working Group had been disbanded and re constituted under Sub Work Group 5.1 of ISO/TC211.

Between 1-2 February 1999 an "Ad Hoc Hydrographic Technical Exchange" meeting was held at the offices of the Canadian Hydrographic Service (Ottawa). The meeting (which constituted a Sub WG5.1 forum) dealt mainly with harmonization issues (both at the standard and product levels). It also provided an opportunity to discuss the present status of harmonization, and future development plans. It was recommended at the meeting, that harmonization issues should be dealt with outside of the ISO forum, and a report submitted to ISO/TC211 WG5.

During the Vienna meeting of ISO/TC211 WG5, (4 March 1999), the convener Olaf Ostenson, (who is also the TC211 chairman) stated that the formation of sub-working groups, such as SWG 5.1, did not fit the recognized ISO structure and he recommended that both the IHO and DGWIG should consider establishing co operative agreements with ISO, and possibly with each other. Not only would this provide a forum to deal with harmonization issues, but it would also enable IHO and DGWIG to, (either collectively or individually), submit proposals for new work items, for consideration by ISO/TC211.

The efforts of the ISO/TC211, CEN/TC287, and OCG will result in the publication of standards for a number component area that are common to both S-57 and DIGEST.

The ISO 15046 could be used as generic base standards from which profile standards (e.g. S-57) could be defined. (A profile simply provides a limited scope of functionality for a specialist implementation). As both S-57 and DIGEST have been used as functional standards (de facto / example), by ISO/TC211, it should be possible to redefine (not redesign) parts of these standards, as profiles of the base standards. The profiling mechanism as documented in ISO 15046-6 describes how an existing standard (for geographic information) can be mapped to the ISO 15046 base standard and may achieve ISO compliance. (A profile, does not need to address the entire spectrum of the base standards, but it must

describe how the functional standard's implementation meets the mandatory requirements, in order for the profile to be registered). The following work items that are relevant to the further development of S-57 have also been proposed for consideration by ISO/TC211:

Reference Model: (ISO/CD 15046 Part 1) It has been reported that S-57 and DIGEST Reference Models are fully compatible and aligned with the ISO/TC211 model. (Presently the S-57 Reference model is defined using OMT whereas ISO uses UML).

Spatial schema. (ISO/CD 15046 Part 7) should be based on the Functional Standards. It may be necessary for specific models that define the Functional Standards, to be included in the this document.

Metadata: (ISO/CD 15046 Part 15). Different approaches have been use for implementing metadata in S-57 and DIGEST and further study is required to investigate how well these models are aligned with 15046 Part 15 Metadata.

Geodetic Codes and Parameters: DGIWG has submitted a Draft Technical Specification for Geodetic Codes and Parameters, which is reported to be fully harmonized with S-57.

Temporal schema: The concept of time is not included in the present S-57 Edition 3. It has been identified as a parameter that should be an integral part of the Data Model for Edition 4. The ISO standard for Temporal schema's (15046 Part 8) should be considered as a basis for this.

Other area of standards development that TSMAD will need to consider, and that are being developed by ISO include are: Part 4 – Terminology, Part 5 – Conformance and testing, Part 6 – Profiles, Part 10 – Feature cataloging methodology, Part 13 – Quality principles, and Part 14 Quality evaluation procedures. A new work item has been proposed for Imagery and gridded data. TSMAD may want to consider proposing its list of producer agencies as the basis for a new work item for a generic set of user codes.

Future requirements for S-57 applications

The future development of the S-57 standard needs careful consideration. Development over the past few years has focused on the ENC requirements. The ENC product specification describes only one area of application for the S-57 standard. There is a growing need for other areas of application such as a format for the exchange of hydrographic data. At a recent IBCCA meeting (November 1998), the need for an exchange standard was discussed. The meeting recommended that S-57 should be used for this purpose.

Since the adoption of S-57, new technologies and initiatives have emerged which , are now influencing the future direction of S-57. Apart from many technical considerations such a requirement for raster and matrix data, marine information objects, the inclusion of a temporal component and many others, there is yet another organizational structure that can not be ignored.

The Global Spatial Data Infrastructure (GSDI) is a relatively new initiative with a goal to facilitate the development of policies and actions that ensure access to information and the delivery of data to users. The GSDI defines itself as follows: "*A Global Data Infrastructure that encompasses the policies, organizational remits, data, technologies, standards, delivery mechanisms and financial and human resources necessary to ensure that those working at the global or regional scale are not impeded in meeting their objectives.*"

During the 3rd GSDI Conference that took place in Australia during November 1998, it was recommended that:

“The organizational model recommended for the GSDI is the global umbrella organization (see <http://www.eurogi.org/gsdi/canberra/>), which brings together regional committees, national committees, and other relevant international institutions e.g. ISO, OGC, ISGM, ISPRS, ICA, etc in the context of principles of flexibility, inclusivity, simplicity and subsidiarity.” (Recommendation 1).

“The standards for Geomatics/Geographic Information and Services now being developed through ISO/TC211 and the OGC be supported, and that participants actively encourage organizations in their countries to actively participate in the development, implementation and maintenance of these standards and of compatible regional and national profiles.” (Recommendation 4).

Conclusion

Both the production and use of ENC data is starting to gain momentum. The TSMADWG is preparing edition 3.1 of S-57 which is due for release (for evaluation) in November 1999. In order to minimize the impact of change to both ENC producers and ECDIS manufacturers, enhancements have been kept to a minimum. It must be recognized however, that the future development of S-57 must take account of both the users needs and the standards development activities taking place within the ISO/TC211 forum. In light of these activities, it is recommended that TSMAD should consider whether it is appropriate for the IHO to establish a cooperative agreement with ISO. It should also consider whether further harmonization with DIGEST, and future development of S-57, should be carried out in the context of the activities of ISO/TC211. (This should include aspects such as whether to continue using the nonstandard version of ISO8211 or whether another more universal (ISO) encapsulation standard such as XML should be considered).
