



Worldwide ENC Database Working Group (WEND-WG)

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Paper for Consideration by the WEND WG

Establishment of a standardised IHO ENC metadata resource to provide consistent and up-to-date data for web services

Submitted by:	IHB
Executive Summary:	This paper describes options to enable the IHO to provide an ENC metadata as a web-based data service and invites the WEND WG to support the concept and provide the appropriate leadership.
Related Documents:	<ol style="list-style-type: none">1. S-100 Universal Hydrographic Data Model - Part 4 - <i>Metadata</i>2. ISO 19115 – <i>Metadata</i>3. ISO 19139 - <i>Metadata XML schema implementation</i>4. ISO 19119 – <i>Services</i>5. ISO 19142 - <i>Web Feature Service</i>6. ISO 19128 - <i>Web Map Server</i>

Introduction

1. IHO MS have collectively made significant progress towards achieving worldwide ENC coverage. The IHO has facilitated the establishment of ENC quality assurance organizations, distribution networks and updating mechanisms, in order to support a worldwide ENC service. However, In spite of this, there is no single authoritative (up to date) source of ENC metadata. RENCs, Data Servers, Data Distributors and others are all gathering their own ENC metadata.

2. This is resulting in a duplication of effort and the publication of conflicting information about ENC availability. Various organizations are collecting similar information, many times over and storing the data in different formats. Certain important metadata elements (such as ENC update information) are usually not captured because of the additional effort required or the lack of access to this important information.

3. Unlike many other digital products, ENCs are provided in a single encoding format (ISO 8211) and conform to a well defined product specification thereby making the extraction of key metadata elements relatively easy to achieve using automated harvesting applications. Furthermore most ENCs, at some stage, pass through a relatively few handling organizations (such as individual distributing HO's, RENCs, Data Servers) before being disseminated, thereby making it possible to formalize and limit the number of organizations that would need to be involved in achieving a consistent metadata harvesting process.

4. This paper indicates some of the well-established technologies and standards that could be used to establish a worldwide ENC metadata repository and how such a repository could be used to support web services available to a wide community of stakeholders. The main components are presented in Figure 1.

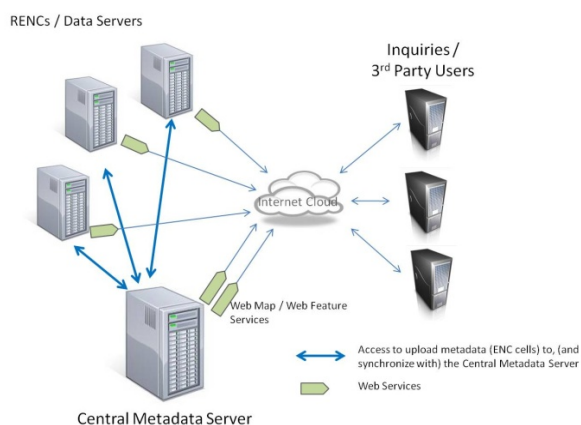


Figure 1 IHO Metadata server

5. Noting that there are many stakeholders that want access to an up to date ENC metadata resource, it is proposed that this information should be made available as an online resource. Furthermore, noting that consumers of the resource may want to use the information in different way, or combine it with their own internal data sources and applications, it is proposed that the resource should be made available as input to web services - primarily Web Map Services (WMS) and Web Feature Services (WFS).

The Provision of Web Services

6. Web services are application components that are self-contained, self-describing, can be used by other applications, and communicate using open protocols. They make it possible for organizations to make their data available via the worldwide web for viewing and for further use and re-presentation according to the needs of particular stakeholders. The original authoritative source data remains intact on the host server.

7. Systems that host or consume web services do not have to know anything about each other – all that is required is a web connection and conformance to Web Service standards. These standards provide a framework for describing how to pass commands to a particular application and how to understand its response. The standards are well established.

8. Web Map Services (WMS) and Web Feature Services (WFS) are two types of services that could be provided for stakeholders to present ENC coverage information within their own applications.

9. The WMS interface is limited in that it only enables web-access to an image based on the spatial information in the metadata database. However this will be sufficient for many users.

10. Other metadata users may want access to the metadata elements rather than a pre-processed image. This could be to assign a projection or to combine the data with other relevant information, for example, to associate the existence of ENC cells to certain chart distributors. The WFS interface specification provides web-access to geographical features data (encoded as GML) from a server using platform-independent calls. A WFS would offer far greater flexibility in the way that, for example, ENC metadata could be employed and published by an end-user.

11. One of the most important features of developing a centralized ENC metadata service is that all applications that use it, will access the same data source and will all have the same level of currency (level of update). At the same time, users of the standardized metadata will have the opportunity to filter, transform, aggregate and present the data in different ways - according to the requirements of their intended audience.

12. The following example illustrates how web services might incorporate ENC availability data using WFS:

Acme Chart Distribution Agency supplies ENC's within a designated area (as defined by a polygon). Acme's customers require that paper INT charts must be provided for those areas where no ENC cells are available. ACME's WFS application connects to the IHO Web Feature Service for ENC and selects all cells that fall within their designated area (that is; within the polygon). Their application then

combines the ENC result with an internal GIS data store that contains the digitized limits of all INT charts in the area, and using a spatial query, it determines which ENC and which INT charts will be required for any intended journey. In future, the INT chart metadata should also be available as an IHO WFS.

13. Other applications that could be developed by service providers are the generation of up to date lists of current ENCs for Port State Control ship inspections the possibilities are almost endless.

Metadata Collection (harvesting)

14. The compilation of metadata can be very laborious if it must be collected via data input forms. Fortunately ENCs already contain fairly comprehensive metadata which can be harvested automatically and converted directly into a standard metadata format. Information (metadata) about updates may have to be uploaded via a web interface. The following are possible ways of harvesting metadata and populating a central metadata server:

Option 1 - Uploading ENC cells to a harvesting server.

15. ENC cells could be uploaded to a centralized secure server that would use a harvesting application to extract metadata from each ENC and store the metadata in a database. ENC cells would be deleted after completion of the process. (This is similar to the method used for the IHO Signature Server located at the IHB).

Pros: Data managers within ENC producer, validation or distribution organizations would not need to be concerned about managing, extracting or uploading ENC metadata files. Procedures could be set up to enable new ENCs, new editions and updates to be uploaded to the harvesting server, processed and added to the metadata resource with minimum intervention from a data manager.

Cons: Upload bandwidth would be required, and there may be resistance from HO's that do not want their ENCs to be uploaded to a remote server. However, the server could be located at a secure, neutral location; for example, at the IHB – as is already the case for the S-63 data signature server.

Option 2 - Use an ENC harvesting application to extract and the required metadata from ENC cells.

16. A harvesting application could be installed at the location of each ENC producer, validation or distribution organisation and harvested metadata would be uploaded to a central metadata server database. This is a similar process to the *IHOMX* application developed by PRIMAR and the IHB through which the IHB is able to maintain the IHO web-based ENC Catalogue.

Pros: Less upload bandwidth required. This option may be more acceptable for some HO's.

Cons: More processing steps required than for Option 1. Less conformity and metadata would have to be screened and integrated before entry in the main metadata server.

Summary

17. The key issues for consideration are whether the IHO should provide a single, web-accessible, authoritative and up to date source of ENC metadata and subsequently extend this to other WMS and WFS. To do this for ENC availability, agreement must be reached on how to implement the models (Option 1 and Option 2) and all parties involved must agree to participate in providing access to the required metadata.

18. Any implementation strategy must ensure that:

- mechanisms (IHO Resolution?) are in place that encourage the relevant contributor organisations to input required data on a regular basis,
- an estimate is made of the resources required to establish and maintain the hardware / software infrastructure, and
- all applications and services are based on contemporary IHO / OGC standards, properly managed and documented in accordance with IHO resolution 2/2007.

Action required of WEND WG

19. The Working Group is requested to:
 - a. **consider** the matters raised in this paper,
 - b. **endorse** the two models for providing ENC availability data via WMS and WFS,
 - c. **investigate** how an IHO WMS and WFS for ENC metadata can be implemented to provide a maintained metadata resource that serves the needs of MS and stakeholders.
 - d. take any other action as considered necessary.