

The Future of ECDIS

After a gap of five years, the 2nd ECDIS Conference took place in Singapore in October 2003. At first glance everything was as before: the venue of the conference, its organisers, the lecturers and companies involved, and – strangely enough – even many of the titles of the presentations. But the most important item had changed and this was the mood in which the topic was presented. Five years ago almost everybody agreed that we were about to see a great breakthrough in the ambitious IMO/IHO ECDIS venture. This time, a gloomy mood of resignation and frustration seems to have prevailed, sometimes associated with finger pointing – mostly at the IHO and national HOs as the perceived causes of the failure. One prominent speaker from the user community even stated "Give me ENC's, not excuses!"

I do not intend here to reiterate this frustration and as the author of this paper I am far from resignation. Rather, an attempt is made to analyse where we are, why we are here, what has changed over the past year and what still needs to be done.

Where We Are

Few will probably disagree with the statement that ECDIS, as the navigation information system satisfying the chart carriage requirement for which it was defined and conceived, has not yet really reached the shipping market. True, all necessary regulations are in place. True, there are more than ten type-approved ECDISs around. True, many ships nowadays are already equipped with ECDIS. True, there are a lot of ENC's in existence, i.e. datasets officially released for use in an ECDIS to satisfy the chart carriage requirement referred to in this paper as 'SOLAS1 -compliant use'. But:

- How many of the world's seas are currently sufficiently covered by ENC? (answer: a few per cent, see Figure 1), and
- How many ships are actually using ENC's for navigation where the coverage is sufficient? (answer: even less!)

Instead, most ECDISs are being used as supplementary navigational equipment, i.e. as ECSs. Even where official data does exist, mariners often continue using non-official data, thereby holding the use of ECDIS below SOLAS compliant level. The only certain logical conclusion that may be drawn from this situation is simple: the services offering ENC's appear much less attractive to the mariner than existing non-official services for ECS, and this fact outweighs in the mind of the customer any gains from using existing ENC's.

What Went Wrong?

It may not be said that IHO has done nothing to develop an effective framework for co-operation between Member States to support ECDIS; the 'Worldwide Electronic Navigational Chart Data Base' (WEND) and is defined, in very general terms, through the IHO WEND Principles. The framework refers to 'Regional Electronic Navigational Chart Coordinating Centres' (RENCs). See Figure 2. RENCs are organisational entities within which IHO members have established co-operation amongst themselves to guarantee a worldwide consistent level of high-quality data, and to bring about co-ordinated services with official ENC's and updates to them. But why has this concept not yet proved successful?

Obviously, IHO and its members have collectively underestimated the time that they needed to establish their ENC production. There is no balancing mechanism here as there is in the paper chart world, where we have the UKHO issuing an international series of paper charts available even when a country cannot itself produce a chart portfolio.

IHO has for a long time downplayed the problems by presenting overly optimistic figures of ENC's production, ignoring the fact that very often these contained simply test data and were not available for the market. In other words, for far too long a time, these problems have not been put on IHO's table in all their awkwardness.

HOs have also for a long time ignored the need for customer-friendly services as a prerequisite for winning the market. The basic principles developed by IHO for ENC services, the WEND principles, did not originally contain even a remote reference to the need to meet customer requirements.

Finally, and probably as a consequence of a certain degree of complacency, IHO members have consistently over-relied on their powers to rule the market, and overestimated the attractiveness of a SOLAS-compliant ECDIS, despite some early warnings. They have therefore ignored the reality that private data manufacturers have controlled the electronic chart market, offering apparently satisfactory services for some time.

It should therefore come as no surprise that we now face a number of problems that are currently impeding the use of ECDIS:

- The demand problem: Due to the adoption of an inappropriate approach in the early days of ENC distribution, when attempts were made to establish ENC's as a new market separate to the existing ECS market (rather than seeing them as complementary until full ENC coverage became available), customers remain in the 'old' ECS market and demand for ENC's is very low. This frustrates data producers (HOs) and service providers alike, because there is no money yet in the ENC market
- The distribution problems: IHO has taken stock of existing ENC's and come to the disturbing conclusion that there are a considerable number of ENC's produced by HO's that have not been made available on the international marketplace. In other words, such data is considered either only to be test data, or it is being used only for internal purposes, or the producing HO's are releasing their data only locally. Thus the market often remains unaware of how many ENC's actually already exist, and this aggravates the demand problem
- The user-friendliness problem: despite the existence of RENCs, the mariner still does not have the option to buy all of the ENC's that he needs for his voyage within a single, integrated service, i.e. under a single user licence, on a single CD and under an all-embracing security scheme. Instead, as an inspection of the services currently available on the market shows, data is actually

offered in more than eleven distinct services (see Figures 3 and 4), some encrypted, others not, and all priced and licensed in different ways. This service diversity contrasts starkly with the one-stop-shop, integrated services offered by commercial data providers. This is, in fact, another dimension of the distribution problem and represents a failure to find a consistent way to bring the ENC products from various HOs to the market. The symptoms of this are probably the strongest factor, after the lack of coverage, working against ECDIS acceptance

- The quality problem: To speak bluntly, a number of data-producing HOs have not yet appreciated the difference between ENCs and paper charts. They are producing and issuing their ENCs as if they were paper charts, without trying to align the content and design of their ENCs with those of their neighbours. The result is that the data is being displayed in almost as many slightly differing interpretations and styles of the ENC standards as there are data producers, with differing and sometimes strange results. Mariners may accept varying paper chart design (and if they do not like that there are always the BA charts, which have a common design), but on an ECDIS they expect a seamless and uniform display. Although this is only superficial, and the intrinsic quality of official ENCs cannot be matched by ECS data, the display quality appears appealing even to those who have a deeper appreciation for ECDIS as an idea
- And last but certainly not least, the coverage problem: obviously there is still too little ENC coverage worldwide, even including data produced but not yet available or available only locally. Without facilitating the inclusion of supplementary data within the integrated service proposition, the mariner will immediately opt for a one-stop service, i.e. a commercial service based entirely on non-official data. This clearly keeps customers away from ECDIS, and the low demand may even discourage some HOs from stepping up their data production

IHO Response

It is becoming increasingly noticeable that IHO members are starting to take a more realistic and pragmatic attitude and to address the problems described above. There are already some important and visible corrections in the course taken by IHO, for example:

- The role of private data providers has been appropriately taken into account by agreeing, in principle, to the concept of SENC2 distribution. This enables service providers to include their supplementary non-official data along with the official ENC data within a seamless and integrated service, and so offer the customer complete route coverage. Although it is left to the individual HOs to decide whether they support SENC distribution for their ENC data, most of those HOs co-operating with one of the existing RENCs have done so
- IHO's WEND Committee, in response to the user-friendliness problem described above, has added a new principle to its list of WEND principles. This new principle for the first time calls for customer satisfaction and requests IHO members to co-operate in supporting the development of seamless and integrated ENC services. The WEND Committee has emphasised the importance of using RENCs for the validation and distribution of ENCs and, most importantly, it has drafted a resolution urging all Member States to co-operate to speed up the production and distribution of ENCs and to ensure greater uniformity of data
- The same Committee has formed a Task Group for nothing less than 'the World IHO ENC Programme': to work with Member States and particularly the Regional IHO Commissions on methods and ways to resolve all the problems identified above. Of course the need for such a group in the first place suggests that the WEND system is failing and it may therefore be concluded that, even today, IHO Member States are not yet completely used to working jointly on common solutions. Indeed, the WEND concept is doomed to fail without all-encompassing co-operation. There is thus now the necessary recognition of an urgent need for co-operation and that this fact must be brought to the attention of Member States and be actively pursued with them.

What Needs to be Done by IHO?

If one agrees that a lack in the user-friendliness of the services currently available and non-uniformity in the quality of this data are key problems inhibiting the uptake of ECDIS, it becomes evident that these cannot be overcome whilst so many HOs prefer to continue operating their services individually. And if these problems persist, then the other problems of too little coverage and availability of data and low demand will also continue to persist. This could result in a collapse of the ECDIS concept, with unknown but most certainly unwelcome and far-reaching consequences for both the IHO as the responsible organisation and for its Member States. After all, an organisation that proves itself inadequate to its task loses its right to exist.

It is thus imperative that IHO members co-operate in support of the provision of uniformly quality-assured, integrated and user-friendly ECDIS data services. In other words, in accordance with the WEND definition of an integrated ENC service, see Figure 5.

"a choice of services where for each service all of the ENC data, regardless of source, are sold to end users within a single service proposition embracing format, data protection scheme and updating mechanism, packaged in a single exchange set".³

Integrated services should be possible for both pure ENCs (no supplementary non-official data) and SENCs (with optional supplementary non-official data) marketed both independently and in competition with each other. In contrast, the currently prevailing system represents a model wherein HOs (or RENCs) provide their respective ENC services separately and these are distributed by distributors in a possibly bundled but non-integrated way, see Figure 4.

Several models for RENCs already exist. It is important to note that the term 'regional' should not be interpreted too literally. Such a RENC may be constituted primarily of participants from a particular region, but it may equally include members from other regions, or even operate globally. The main focus, though, is co-operation in order to ensure uniform data quality and to facilitate integrated services. There are two RENCs in operation today:

- Primar-Stavanger (P-S) operated by the Norwegian HO, covering mainly the waters of Norway, the Baltic Sea, the waters of France and Greece. It works through distributors, distributing the encrypted ENC service of P-S, and it has one appointed SENC distributor (C-Map) acting as a Value-Added Reseller (VAR)
- The International Centre for ENCs (IC-ENC), operated by the UK HO, covering mainly the waters of the North Sea, UK, Spain, Portugal, Greece, the Suez Canal, South and parts of West Africa, parts of the Indian Ocean, and some of the Islands in the Mediterranean and Caribbean. The IC-ENC works through Value-Added Resellers (VARs). There are three VARs appointed at the time of writing: The UKHO ECDIS service, C-Map and Chartworld (the latter two are SENC distributors)

Both RENCs have in operation a central infrastructure that performs the necessary services such as data validation, quality control and contract management. P-S additionally operates the encrypted security system for their ENC service. Both RENCs are ready to accept

HOs as co-operating members from outside Europe. They have established mutual technical co-operation and are working to align their currently differing distribution models, particularly for services where ENC's are delivered in their original S-57 encapsulation.

A RENC that does not have some kind of central infrastructure is often referred to as a 'Virtual RENC' (VRENC). Led by Italy, such a VRENC is presently under construction for some areas in the Mediterranean Region.

The following options exist for HOs:

- Join one of the existing RENCs
- Form a new RENC in a particular region of interest independent of, or in co-operation with, existing RENCs. IC-ENC has developed a framework to transfer its own structure and tools to other places in order to facilitate the establishment of further regional operational centres controlled locally but lying within the wider IC-ENC co-operative framework
- Create a kind of regional or international co-operation, e.g. following the VRENC approach, or an amalgamation of a RENC and a VRENC, or something else agreed upon between any IHO members

Forming (V)RENCs or joining one of the existing ones would help to overcome practically all the problems described above. However, it is crucial that those HOs preferring to stay on their own, as well as all RENCs, are mutually compatible with each other in terms of quality and rules for releasing data onto the market, and that they satisfy the requirement for integrated services. In particular, it is imperative that RENCs, Regional Hydrographic Commissions and individual Member States co-operate with the WEND Committee and the WEND Task Group to:

- Ensure that the data and updates to it fully conform to the relevant standards, and that the quality is consistent for all data distributed as official IHO data
- Ensure that the data is made available for inclusion in integrated ENC services
- Accept SENC distribution ¹ without which there will be no possibility before full ENC coverage is available for service providers to offer the existing ENC's in a single package with other supplementary non-official vector data for complete route coverage
- Allow for competing quality services ² only with competition between service providers will there be the necessary incentive for them to customise their services to a maximum extent and to attract mariners
- Step up ENC production, prioritised by importance to shipping

Initial progress was achieved in Tokyo at the last WEND Conference in March 2004:

- With adoption of the principle of 'integrated services' IHO Member States have accepted the need for closer co-operation on availability and quality of data and services
- The Regional Commissions, either on their own or using the services of a RENC, have been recognised as the principal hubs around which to establish this co-operation
- Regional Commissions are requested to identify where assistance is necessary to develop ENC production capabilities for the countries in their region
- The WEND Task Group and some Regional Commissions have developed draft schemes for small-scale ENC coverage in their region as a step towards closing major gaps in ENC coverage of the oceans. These draft schemes are now subject to consideration within Regional Commissions for acceptance and agreement on producer responsibilities

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The conclusions of the 8th WEND Conference need to be implemented for all regions as soon as possible. This requires strong leadership on the part of the Regional Commissions and the equally strong commitment of its member HOs. Countries who succeed in setting up ENC services will be rewarded as having best served the interests of their own merchant and naval fleet and contributed to the improvement of maritime safety and efficiency in general. But at the same time they will achieve the spin-off of securing an invaluable GIS database that they can use for multiple purposes of coastal administration.

Notes

1 The International Convention "Safety of Life at Sea" (SOLAS) defines in its Chapter V, among other things, the chart carriage requirement for seagoing ships. The latest revision of this Chapter, which came into force in July 2002, also defines the conditions for the SOLAS-compliant use of ECDIS.

2 SENC=System Electronic Navigational Chart is the internal ECDIS

data base in a proprietary data format used for display; it is normally generated automatically inside an ECDIS. The SENC distribution is a method where the SENC is pre-produced by a service provider with the option to add supplementary data where needed for route coverage.

3 Adopted at the 8th WEND Conference, March 2004