

MAINTAINING SAFETY IN THE ELECTRONIC ERA

The Marine Charts Market: Long-term Evolution

Electronic charting offers many opportunities, but also many problems. Much has been and is said about so-called competition between official Hydrographic Offices (HOs) and private chart producers, especially concerning electronic charts. Fast-moving technology and markets and long production cycles mean that private companies and HOs need a continuing and prospective overview of markets. This paper presents a vision of the future based on both historical perspective and analysis of profitability and liability.

Up until the eighteenth century marine charting was mainly a private business. It then became more and more obvious that commercial interests could not be relied upon for maximising safety, and that century saw the creation of the first HOs. Private Producers (PPs) were still allowed, but for official use their charts had to be validated by an official HO (at least in France). With the passage of time, most surveying went to the HOs and other official authorities and charting naturally followed suit. Good surveying and safe charting are expensive and the private producers took to copying official charts, with some added value in changing the “look” of charts: coverage, scale, colours and symbols, according to their marketing views. Such activity required licensing by the HO concerned and these licenses generally stipulated that the copied chart was not officially suitable for navigation; a corresponding disclaimer must be written on the licensed charts. This ambiguous state of affairs lasted for decades and seemed to satisfy everybody for purposes of pleasure craft navigation, given that only official charts were allowed for the navigation of merchant and passenger ships. There is no real market for original charts, except as a unique source from official HOs. The “paper chart market” is a market of value-adding copyists. The states have for a very long time accepted the pseudo-competition of copyists, which have contributed to setting a market price which, by a kind of boomerang effect, has influenced the price of official charts. This twisting of normal market rules is probably the effect of much more efficient marketing and lobbying by private producers than by HOs, most of the latter having officially no resource for marketing and lobbying. Considered as producers, despite the fact that their work is mainly copying of some kind, the PPs pay royalties to the HOs publishing the original information, but keep most of the income for themselves. This has been going on for so long that it is very unlikely that the situation regarding paper charts will change. But electronic-charts are a completely different thing.

The EC Revolution

The display characteristics of electronic charts may be modified at will by a user within the constraints of computer functionality introduced by the developer according to adequate standards. It follows that value-adding copying by private producers has no place in electronic charting. The official chart bearing officially validated information, any modification of this information¹ can only decrease safety (if the PP knows better, it has the obligation to immediately transmit the relevant information to the competent HO).

Only Reproduction

PPs will have to buy official Electronic Navigation Charts (ENCs) from HOs instead of simply paying them royalties, and that will make a difference. But they may resell ENCs with additional information, and may offer the customers tailored services like logistic and touristic information, special photographs, and load-on-demand et cetera. For all this they need the co-operation of HOs, because tailored services will be based on the service options offered by HOs and because added information will probably demand links with ENCs, for which some compatibility and stability of the ENCs will be needed.

Some might think, or hope, that HOs will stop short of digitising their whole portfolios, leaving room for large-scale unofficial charts mainly dedicated to pleasure craft. This is not actually the trend: HOs will digitise all their charts because they are the only basis for the safety of all mariners, and this will take time because safety is expensive, as will be explained. They have undertaken digitisation from the merchant and passenger shipping side because this is the domain within which the consequences of accidents are potentially the most catastrophic - but safety applies to everybody.

As an intermediate conclusion, we observe that PPs are not in competition with HOs but with their customers, and that is not competition. PPs wishing to continue their presence on the markets of the future have to invent new products and new services using ENCs, and for that they need HO co-operation. For their part, HOs welcome such prospects of co-operation and thus have to take account of their own limitations, including the fact that they belong to the public sector and are consequently subject to rules that lengthen development processes and limit recruitment capacity. All this may be seen as a corollary of the fact that original charting is not profitable, as will be explained.

The Cost of Safety 2

If there is no potential competition on traditional PP markets, could there be competition upstream in the original chart-making activity? We have observed that such competition has not existed for about two centuries, but the conditions may change. Could safe original charting become a competitive, profitable business?

The only answer seems to be “no”, for at least three reasons:

- only States can be made liable for the consequences of costly catastrophes, and catastrophes due to errors in charting are unavoidable in the long run
- charts would have to be certified in some way by officially notified bodies according to precise standards, but the safety of chart-making seems to be largely out of the reach of standardisation. This is because it rests mainly on the competence of trained and qualified human brains, closely monitored by seniors during training, necessary for the intelligent processing and synthesising of intermediate information, which is thus modified
- as we are aiming for very high levels of safety, the last and least aspects of safety (we speak of tenths of millionths or less) are as expensive to protect as the main components of safety (see Figure 2) and “safety” is itself very difficult to measure precisely. this means that competition, by inducing lower prices in the short term, would undoubtedly increase the rate of catastrophes in the long term. This is the more so as the safety of chart making cannot be standardised and catastrophes are, hopefully, too rare for quality management systems alone to be allowed to handle safety issues.

We must observe that the trend of post-catastrophe decisions is, at least within Europe, oriented towards the extension of States’ prerogatives and responsibilities rather than the reverse; see for instance the creation of the European maritime safety agency after the Erika disaster.

Data and Systems

ENCs are sets of data validated by fully liable HOs. Systems are certified (type approved) by notified bodies. The certification of systems is feasible only on the condition that standards can be devised that allow for safe certification, including the assurance that the said systems do not modify information. No other type of global organisation exists for electronic navigation or for similar safety-critical domains. There is a consensus that such standards may be devised for navigation in general.

A great deal of fuss is being made about ECDIS versus ECS; ECDIS defects are quoted as showing that ECS would be sufficient and less expensive. This view seems to completely ignore the necessity of certification. ECDIS defects only prove that ECDIS standards must be improved, and this is normal for young standards. In order to ensure the safety of ECSs, ECSs should be standardised and the only standards that exist for SOLAS vessels are ECDIS standards. A certified ECS is by definition an ECDIS.

The real problem lies in improving ECDIS standards. Those who promote ECS probably mean that ECDIS standards have to be completely overhauled, despite their relative youth. It may be observed here that the problem is not limited to ECDIS but encompasses entire integrated bridge systems; standards have to evolve towards a more systemic approach, with greater emphasis being put on software, but this is another issue that will in itself necessitate long developments. It will not be tackled here.

Concluding Remarks

The old market based on drawing information from paper charts will slowly vanish over the next decade or so. The old cash cow still has plenty of milk to give, but healthy companies should use the remaining time and corresponding cash for preparing for a future in which paper charts become mere print-outs from electronic charts, with very little added value: in effect, reproduction official electronic charts. New services have to be invented, including customised additional information, and these have to be developed in co-operation with hydrographic offices, with RENCs (official Regional Electronic Navigational charts Centers) and with the IHO (International Hydrographic Organisation), not in competition with them. Standards have to be improved, as does any standard, and this too demands strong co-operation between private companies, probably via their representatives, and the official hydrographic world. This is one of the important aims of amendments to the IHO convention currently being drafted by the strategic working group of the same organisation and submitted to an extraordinary conference in April 2005.

The Internet “bubble” imploded in great part because there was not enough sellable “content” to be put on the net. We have in hydrography a good example of what it takes to put information into the right form for safe use. It takes a long time, in any case, and everything that defocuses our global efforts just makes that longer. So let’s work on the real issues, with the full co-operation of all involved interests. It will not be simple, but it is the only real way ahead.