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THE NEXT GENERATION PAPER CHART

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Abstract

The paper chart can take the next step in its evolution by extracting S-57 electronic navigation chart (ENC) data from a database and directly printing it on paper. A redesigned paper chart would provide further improvements in CHS service to clients in a number of areas:

- eliminate the large A0-size chart; smaller charts mean more options for digital printing and the product is convenient to handle
- incorporate a legend on the chart (no need for a separate book of symbols and abbreviations)
- incorporate Sailing Directions and Tide Tables
- start a regular new edition cycle, updating advertising, hydrography and imagery
- move titles, notes, non-spatial features to white space around the chart data
- remove all land detail and replace with detailed remotely-sensed imagery
- show a 1-800 number and CHS web address for questions and comments on the chart
- show paid advertising pullouts on the chart face to highlight client services (e.g. restaurants, fuel, repair shops)
- carry paid advertising on the back for major sponsors as well as non-commercial advertising (e.g. Coast Guard, Parks Canada, CHS, provincial governments, etc.)

Existing paper charts represent years of evolution in symbology, styles, scales and schemes. S-57 requires conversions to common datum and units of

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measurement, and resolves overlaps to provide homogeneous coverage. The paper chart would benefit from these developments, and evolve to become a more useful product to its clients.

INTRODUCTION

In recent years in the Canadian Hydrographic Service (CHS) there has been a great deal of attention focused on electronic chart display and information systems (ECDIS) electronic navigation charts (ENC) and the various standards and specifications surrounding this new technology. ENCs have been added as an entirely new product in the line of CHS products at a time when CHS, like everywhere else in government, is undergoing dramatic changes in size, budget and staffing levels. In many respects adding a new product line during this time is going "against the flow."

Driving much of the change is the widespread adoption of ECDIS in Canada by commercial shipping companies, as well as the Canadian Coast Guard (CCG) and the Department of National Defense (DND). What opportunities exist to take advantage of some of these changes? This paper describes some of the possibilities for changing and improving the paper chart as a result of developments in electronic charts.

PURPOSE

The Next Generation Paper Chart is an attempt to demonstrate that as the needs of clients change, and as the CHS changes, so can that age-old product, the paper chart, also change. It can become a more appropriate product in these days of cost-recovery, increasing recreational boating, and the shift in attention away from the paper chart in favour of ECDIS for larger ships.

The early thinking behind this topic started when someone looked at an ENC on a computer screen and said, "what would happen if that were printed on a plotter?" So we tried it. What came out held the promise of better things. If CHS could optimize the use of its limited staff to produce *only* S-57 data instead of some staff producing paper charts and some producing ENCs, could both products be generated from the same data? Well, the first answer was that we'd have to do a lot of reverse-engineering to make S-57 data look like "traditional" paper chart information. The obvious follow-on question was "why"? Sure, the ENC is designed for screen display. But it might be much easier to work with that and make it better for presentation on paper than to completely reverse-engineer S-57 ENCs to look like the traditional paper chart.

The subject quickly turned to "what else could be improved?" What followed was a series of ideas, experiments and trial-and-error tests to check out

different scenarios and to facilitate discussion. This paper is a description of many of these ideas.

RESULTS

Who Wants an A0-size chart? For years Hydrographic Offices around the world have produced, predominantly, these large-format charts. They fit into a whole infrastructure that supports "large charts", from big printing presses to the cartographer's large drafting desk to that big chart table on the bridge of the commercial, Coast Guard or navy ship. Of course the pleasure boater, being confined to a somewhat smaller "bridge", has had to contend with the problem of managing a large chart in a much smaller physical space. At least in a car, the road map folds up. In Canada the trend is towards ECDIS for the aforementioned clients. So who will remain as clients for the venerable A0-size chart?

> Proposal No. 1 – Eliminate the A0-size chart in favour of something more practical for a broader spectrum of users. This could be accomplished by printing on A1-size paper with no other change to the original A0-size chart except for printing part of it on the front and using the normally empty back of a chart to print the other half of the chart. The result is a chart that is easier to handle and uses less paper to print. There would have to be some overlap in coverage between the front and back of the charts to allow positions to be transferred. However this may not prove to be a major issue if most of the clients are pleasure-boaters. For CHS it means that smaller presses and plotters can be used to print charts. As digital printing grows, CHS can thus take advantage of the more prevalent smaller plotters. Ultimately smaller plotters could allow CHS to print charts closer to the client over a distributed network or, ultimately, at point-of-sale.

The Birth of a Legend. Anyone who has ever purchased a road map or taken an introductory cartography course knows that maps carry legends. They help tell the user how to interpret the map. Why is there no legend on a paper chart? In fact, a completely separate book is required to explain the various features that *may* appear on the chart you have just purchased.

> Proposal No. 2 – Put a legend on the chart. Here is another good use for all that white space on the back of the chart. Many charts also have space available on the front of the chart, either to the side or within that vast buff-coloured space. Instead of showing immense detail of areas of land that cannot possibly be seen visually from the water, or by radar, why not remove those lakes-behind-mountains, partial road networks, hidden (from the water) topographic contours and use the area to give the user something that will really help? In these days of digital chart production each chart could have its own legend generated to provide information specifically about features that appear on that particular chart.

The Ebb and Flow. Unless it is of the frozen variety, most navigable waterways are subject to the action of tides and currents. This is another case where a separate document is required to understand how this modifies the information portrayed on the chart.

> Proposal No. 3 – Another possible use of the available space on a chart: print part of the tide tables. A tough call, however, since there may not be enough room in all cases to provide the appropriate detail.

Speak Up! Charts have the potential to tell the user more about a specific area. They currently describe the existence of facilities specific to the marine infrastructure. However in many cases the user wants to know more, such as "where can I have my engine repaired" or "where can I buy food and fuel?" or "where can I get tourism information?" Sailing Directions does some of this now but the chart can provide summary information of a specific nature.

> Proposal No. 4 – Advertise on charts in a way that will help the user of the chart acquire more specific information of an area. Simple advertisements could be sold and placed on the face of the chart. Revenue for paid advertising could be re-invested in Canada's hydrographic surveying and chart production programme to continue improving the products. Charts would stay current (the chart information and the advertising) by putting more new editions out with greater frequency:

Speak Out! Regularizing the frequency of new editions would benefit clients since Notices to Mariners (NTM) would be incorporated into new editions sooner. There would be fewer chart errors as a result; clients would not have to apply corrections to charts as often, and CHS would have to perform fewer hand corrections to in-stock charts prior to distribution. Clients may be likely to purchase more charts because they are "new."

> Proposal No. 5 – Get charts on a regular maintenance and new edition cycle. Support this by using available space on charts to sell advertising, which would generate revenue for CHS to improve the new edition service. These "chart sponsors" may include provincial governments, large corporations in the marine and related business, federal government, the tourism business, and so on.

Help! The world is full of telephones, cellular phones, computers, fax machines and radios.

> Proposal No. 6 – For after sales service, provide access to product support by showing contact information on the chart. There could be a CHS 1-800 number as well as the location of the CHS site on the World Wide Web (www.chshq.dfo.ca).

Land Ho! There are a number of satellites orbiting far above the Earth. Imagery for most of Canada is widely available and is updated on a regular basis. Can we use this to provide better information for the chart user?

Proposal No. 7 – Evaluate the use of satellite imagery on the land-area of charts. A composite chart-imagery product may provide enhanced benefit to the end-user. The imagery portrayed would be updated as part of the regular updating cycle of the paper chart.

Conclusions

The Next Generation Paper Chart was built to test new ideas and to create discussion. It is part of the process of continually improving the delivery of programmes and products of CHS. As technology advances and new products emerge there are also opportunities to improve the legacy products of older technologies and at the same time improve value to clients and gain organizational efficiencies.

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