

Joining the Hydrographic Big League

A Bilateral Partnership Lifts Croatia's Hydrographic Offering

Croatian hydrographic authorities had the necessary skills to run a production line for digital charts for commercial and light marine users, but they lacked key tools and resources. Starting in 2005, in a project called CRONO HIP, the Norwegian hydrographic community contributed technology and methods for data collection, data management and nautical chart production to their Croatian peers. Now, Croatia's offering is second to none. This example creates a model for future efforts in the hydrographic community on the acquisition of hydrographic data and organising it into a chart database.



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THIS STORY BEGAN SHORTLY after the end of Croatia's War of Independence in the 1990s. The government of Norway, seeking to help the young Balkan republic, initiated an extensive effort to help Croatia survey and map its territory – including minefields, which needed to be plotted and cleared. These projects were a success, and Norway's Mapping Authority extended the collaboration to Croatia's territorial waters in an equivalent hydrographic project, called CRONO HIP (Croatian-Norwegian Hydrographic Information Project).

CRONO HIP

CRONO HIP was carried out by the Norwegian Hydrographic Service and the Hydrographic Institute of the Republic of Croatia. The project was funded by the Norwegian government. CRONO HIP aimed to give the Hydrographic Institute of the Republic of Croatia (HHI) a complete digital production line,

so that the organisation could manage the data flow from surveying, data processing, data management and chart/electronic navigational chart (ENC) production. Altogether, the project involved an investment of approximately USD2 million from the Norwegian Ministry of Foreign Affairs, which covered the acquisition of a multi-beam echosounder system for Croatia's survey fleet and a software package for turning source data into charts that are verified and ready for distribution. From an international tender, Jeppesen Marine was elected industry partner.

Jeppesen Marine believes this project demonstrates that a relatively small country can establish a hydrographic offering of very high quality with a relatively limited investment. Croatian authorities have managed this project from start to finish, with technology and expertise from Norway based on similar work.

Facing Challenges

Hydrographic offices around the world face challenges related to producing and managing the necessary electronic charts and other navigational data required to meet upcoming regulations and international conventions. A country such as Croatia, a young republic emerging from a bitter war, faces a particularly tough route, with scant resources. Despite agreements with commercial providers who surveyed Croatian water and published charts approved by the HHI, coverage of Croatian waters was limited. In order to develop the kind of coverage and services needed by modern coastal traffic, Croatia sought to introduce new, modern systems for mapping and managing hydrographic data. CRONO HIP aimed to bring to the HHI the capability of developing its own hydrographic data and organising it into a chart database. In order to streamline this effort, CRONO HIP tapped Norway's recent experience incorporating new software to

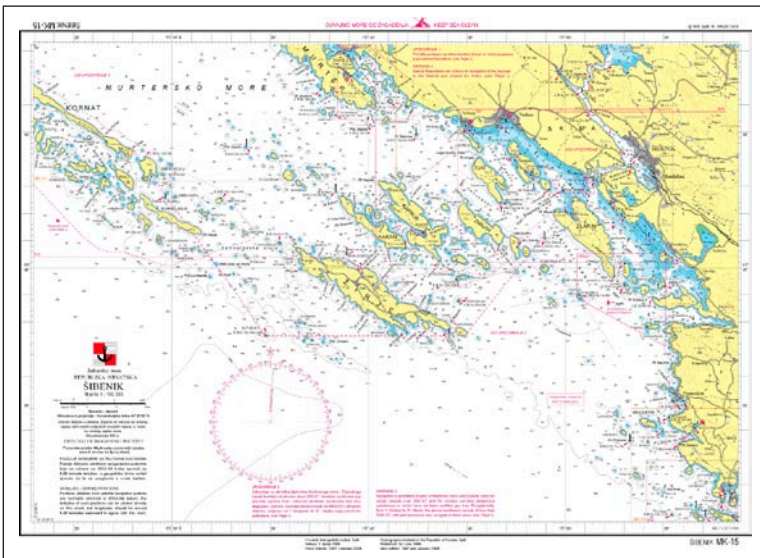


Figure 1: A chart of the Sibenski Canal near Vodice.

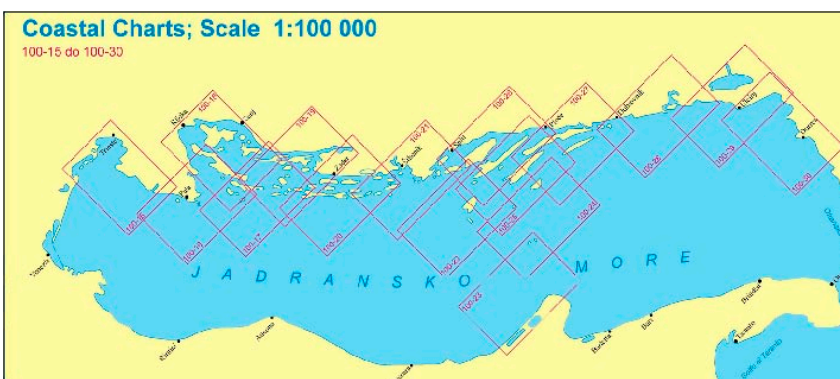


Figure 2: Sets of coastal charts that have been generated.

improve the efficiency and quality assurance of chart production and updates. This Norwegian software implementation project, a collaboration between the Norwegian Hydrographic Service and Jeppesen Marine, covered a similar task: implementing a complete production line for ENC's and paper charts based on a data feed from an existing Oracle primary database. This project covered all product extracts from source to chart, with a fully integrated maintenance system.

Specification

CRONO HIP began with an extensive study of the technical and economic feasibility of the digital production line. This study weighed the resources available to the HHI in terms of competence and capacity, in order to determine which tasks would be completed by the HHI and which would be completed externally. Analysis of the technical requirements and capacity of the production system, including a review of technol-

ogies, costs and alternatives, was also undertaken. Finally, the project emphasised capacity building within the HHI for the long term. Input to the hydrographic database was split between hydrographic fair sheets (Croatia has approximately 25,000) and surveying undertaken by multi-beam echosounding systems. Both the vectorisation software and the multi-beam survey system required specific training programmes for HHI staff and its partners.

Together, the HHI and the Croatian government staked out a five-year plan to multi-beam survey an area of 6,800km², to a depth range of zero to 150 metres. This area would cover major coastal zones, channels and bays, but not Croatia's big harbours. Of the 25,000 analogue sheets, the HHI would vectorise over 1,800, including harbour plans and nautical chart reprints. Between Croatia's existing hydrographic coverage, new surveys and vectorisation, the HHI would finish with 75 paper charts

(four overview charts, 30 general charts, 16 coastal charts, three approach charts and 22 harbour and berthing charts) and 125 ENC's (see Figures 1 and 2).

Roll-out

The data management system had to build on HHI's existing Oracle database system, which could also link up with the State Geodetic Administration in Croatia. This system should convert processed bathymetry data, vectorised fair sheet data and other marine information into a library of ENC's and hardcopy charts. Jeppesen Marine's dKart Office software package was selected to manage this process. dKart Office manages the whole hydrographic data process from its collection to its publication. As the HHI was already using the dKart software for editing and inspection of S-57 data, and had trained many staff in dKart, it was less cumbersome to employ other modules in the dKart Office package for chart production and management.



Figure 3: The team involved in the CRONO HIP project, with Dr Nenad Leder of the HHI (fourth from left) and dKart training specialist Justin Hornby of Jeppesen Marine (standing to Dr Leder's left).



Figure 4: The survey vessel *HIDRA* of the HHI.

A small country can achieve this with relatively little investment

Broader impact

Today, the HHI is well underway managing and producing ENC's. Its staff has received training in the vectorisation software and data management systems (see Figure 3), and the 2 to 4 gigabytes of geographical information streaming in from the echosoundings are being organised on-site into the office's portfolio of hydrographic products (see.)

CRONO HIP's impact was felt immediately on high-speed ferry traffic, which – according to International Maritime Organization (IMO) rules – had to carry electronic chart display and information systems (ECDIS), running on ENC's, by mid-2008, at the latest. It establishes the HHI as a top-level hydrographic office, with complete capability to chart and manage ENC's for its waters. The broader significance of CRONO HIP is for other countries around the world that face challenges in raising their systems and offering to the level demanded by new IMO and International Hydrographic Organization (IHO) conventions.


Useful Approach

"This project might serve as a valuable template worldwide, especially for smaller hydrographic offices, which can follow this model in total or in part," said Noralf Slotsvik of the Norwegian Hydrographic Service. "The used approach could be useful especially in capacity building, as it allows the users to build up via modules. In a developing country, for example, one could start with the most elementary modules, such as data management and S-57/ENC creation."

Slotsvik refers specifically to experiences from an advisory visit to Angola. There, a number of private companies had undertaken surveying, but the hydrographic authorities are still not yet able to organise and manage the data. Structuring the data is an initial first step to producing charts. "In Croatia, it was mainly tools that were lacking, but in other situations, the challenge is both skills and tools. We ran a project in Mozambique for many years, where we provided formal education, equipment and on-the-job training.

This was a more complex situation and it was a time-consuming project. Due to the high level of skills in Croatia, the CRONO HIP project could be finished within limited time," said Slotsvik.

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