RESTRUCTURING OF A NATIONAL HYDROGRAPHIC SERVICE – CROATIAN–NORWEGIAN HYDROGRAPHIC INFORMATION PROJECT (CRONO HIP)

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Abstract. The Norwegian Hydrographic Service (NHS) and the Hydrographic Institute of the Republic of Croatia (HHI) have successfully carried out a joint project named the Croatian-Norwegian Hydrographic Information Project (CRONO HIP).

The main goal of the project was to provide the Hydrographic Institute of the Republic of Croatia with new technology and methods for data collection, data management and nautical chart production. The project was carried out in co-operation between the Norwegian Hydrographic Service and the Hydrographic Institute of the Republic of Croatia. Jeppesen Marine was elected industry partner by international tender.

In addition to drawing from experience that the Norwegian Hydrographic Service had acquired from their own recent MINTEC (Maritime Infrastructure - New Technology for production/management of Electronic Navigational Charts and paper charts) project, the CRONO HIP project built also on experiences gained during the Croatian Norwegian Geographic Information Project (CRONO GIP), supporting the topographic mapping activities in Croatia through support to the State Geodetic Agency (SGA) and the Croatian Geodetic Institute (CGI).

Key words: National Hydrographic Services, cooperation, Capacity Building, Public Private Partnerships, Croatia, Norway

1 PROJECT OBJECTIVES

1.1 Digital production line

The main objective was to define a complete digital production line in the HHI and to implement a production and data management capacity within the organisation. The production line would have to cover the data flow from multibeam surveying, data processing, data management and chart/ENC-production. In addition, the project facilitated scanning and vectorisation of existing analogue fair sheets. Special emphasis was put on establishing quality mechanisms in the production line

1.2 Scanning and vectorisation of analogue fair sheets.

A relevant part of the HHI's hydrographic fair sheets was scanned, vectorised and submitted to a data management system that supports production of electronic and hard-copy nautical charts as a part of an overall digital production line. Through the project HHI was provided with the necessary software, hardware and training.

1.3 Multibeam survey system

The HHI established adequate capacity to undertake multibeam survey data acquisition using HHI's vessels, and also established data processing facilities. The HHI acquired multibeam echo sounder systems, together with a system for archiving, post processing, data reduction and data management, as a part of the production line.

1.4 Spatial data management system

A task and object oriented database system was established in HHI for efficient management of hydrographic information, as a central part of the HHI's production line. The established database system also enables HHI to better manage other hydrographic information such as electronic chart data, tidal measurements, oceanographic data, Notice to Mariners, etc. The database system is closely integrated with the chart production and management system. Future interaction with Spatial database server in the State Geodetic Administration in Croatia was emphasised.

1.5 Chart production and management system

A requirement from HHI was to strengthen the digital production facilities to support an integrated and synchronized production of electronic and hardcopy charts, as a part of a digital production line. The analysis performed during the specification process resulted in an approach of looking for one system/supplier covering the whole production line from post processing to chart production and subsequent maintenance.

1.6 Quality system

The project was set out to be implemented in a way that it would simultaneously support the establishment of a quality system in HHI. The implementation of a quality system was not part of the project

2 PROJECT TASKS

2.1 Feasibility study for establishing a digital production line in HHI

A technical-economical feasibility study for a new production line was conducted as the first stage of the project. The study outlined the requirements to the organisational system (structure, competence, capacity etc.) and evaluated which activities had to be done internally or externally. It discussed technical requirements and capacity for a new production system, outlined any constraints to be expected when changing technology, analysed the total cost of the proposed solution(s), possible alternatives etc.. How to balance the capacity between the different activities in a digital production line was emphasised. It was also important to keep in mind that the capacity building in the project should be levelled with the goals/objectives of HHI on a longer time scale.

2.2 Scanning and vectorisation of analogue fair sheets

A scanner system should be operated by HHI or a partner, for example the State Geodetic Agency (SGA). A few workstations would need to be installed at HHI for conversion of hydrographic fair sheets to digital form. In addition a file server is to be installed to support online storage and usage of scanned raster files. The fileserver shall have a basic backup system.

The vectorisation software shall be integrated with the spatial database system in the sense that an efficient way for uploading of vectorised data must be developed.

A specially tailored training program shall be conducted at SGA's scanning centre in Zagreb. The supplier of the system should preferably establish a local entity in Croatia, which can provide support on the vectorisation software and general training in the software, both in Croatian language. Most of the training related to vectorisation software shall be given in Croatian language by supplier's local support office. Software shall be delivered with support for the whole project period. The vectorisation software shall be tailored to Croatian fair sheets standard.

Croatia has approximately 25,000 hydrographic fair sheets, and one task is to qualify the most relevant subset of sheets for conversion. The final number of fair sheets will be determined during the Feasibility Study.

HHI will provide manpower for scanning and/or vectorisation activities as required.

An expert from Norwegian Hydrographic Service will assist in the specification of the system and in the initial phase of the scanning and vectorisation activities.

2.3 Establishing a multibeam survey system

A multibeam echo sounder system should be delivered to HHI. The system must include additional sensors (surface and profile), heading, gyrocompass, vessel motion compensation system and positioning system. Software for survey planning and data processing should be part of the delivery.

Experts from Norwegian Hydrographic Service (NHS) will give support to prepare requirement specifications, installation and testing (calibration) of the multibeam echo sounder system and additional sensors. The work is to be done in co-operation with HHI experts.

Training must be conducted on site both as classroom training and on board the vessel(s). The vendor of the system must play an extensive role in the training programme. Special attention should be made to testing and calibration methods.

HHI will provide manpower and make vessel(s) available for the survey activities during the test period.

Post processing, data reduction and management of the multibeam echo sounder data and related data, data storage and archiving must be defined in Feasibility Study. If necessary, experts from NHS will assist in these activities (depending of the type of equipment purchased).

Methods/routines for utilisation in a production environment should be described and documented.

2.4 Establishing a Spatial Data Management and Chart Production system

Based on the feasibility study, the project shall procure and implement a complete system for managing the spatial data and producing/managing ENCs and hardcopy charts. If required, the system shall include all data management and chart/ENC-production tools and processes.

The activity shall provide procedures, software and solutions to efficient transfer and preparation of data for uploading to the spatial database system. A data model will be developed to facilitate management of processed bathymetry data and vectorised fair sheets data. The data model shall be extendible for integration of other marine information.

The spatial data management system will preferably build on the existing Oracle database in HHI, to make the most of HHI's experience with this system. Also, emphasis will be put on possible combined action between HHI and the State Geodetic Administration in Croatia, which also is using an Oracle Spatial database.

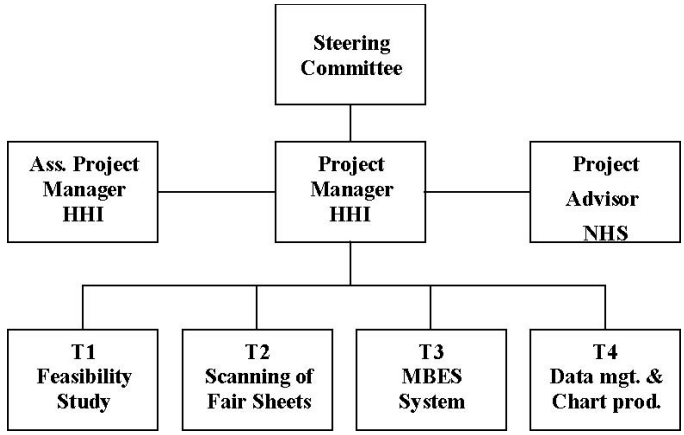
HHI has done some investment in dKart software for editing and inspection of S-57 data, as well as training related to the software and S-57 in general. The new system may build on this software.

The NHS is currently procuring a new chart/ENC production system, and experience from the organisation's technology development work will be input to the activity.

If needed, a consulting company will be given the task to produce necessary specifications for the new system in close co-operation with HHI, and with contribution from NHS. HHI shall, in co-operation with NHS undertake the procurement based on the developed specifications.

3 PROJECT MANAGEMENT AND ORGANISATION

The directors of HHI and NHS will lead the Steering Committee, and appoint the other members of the committee. The Steering Committee's main role is to ensure that the project's main goals are achieved, and to make decisions concerning the project's overall plan and budget.



The HHI will be responsible for appointing a project manager for the overall project. The project manager reports to the steering committee. His main duty is expert leading of the whole project and is responsible for progress, results, reporting and risk management, according to the suggestions of the Feasibility Study and Steering Committee. The project manager will work in HHI's office and in close co-operation with HHI's management and staff. The HHI will also appoint an assistant project manager, responsible for advising and supporting of the project manager.

The NHS will appoint a project advisor who will manage the Norwegian contribution to the project, including manpower, expertise and funding. The project advisor will co-operate with the project manager.

Each main project task will have a task leader. The task leader will report to the project manager, and will be responsible for the task accomplishment. The task leader can be HHI staff or hired consultant. For procurement processes the task leader might be the vendor's main representative.

4 PROJECT SCHEDULE

The project is expected to last for 36 months.

Within this time frame the scanning and vectorisation of analogue fair sheets, and the establishing of a multibeam surveying system, will be completed. The specifications for a production line will also be produced, but procurement and implementation of the complete system may require additional funding. This will be clarified through the feasibility study.

The project manager will be responsible for building and maintaining the project plan and schedule.

REFERENCES

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Norwegian Hydrographic Service, Tore Haye Hydrographic Institute of the Republic of Croatia, Zvonko Gržetić and Željko Bradarić Jeppesen Marine, John K. Klippen

BIOGRAPHICAL NOTES

Egil O. Aarstad, Manager; Jeppesen Marine, has been working for the HydroService Business Unit in C-Map then Jeppesen since 2002. With a degree in electronics from Stavanger University he started his career in marine electronics product development. With additional education in international business he later took a special interest in developing, managing and training of international distribution networks. With experience from management positions in Norwegian international companies he now heads the HydroService business unit of Jeppesen Marine. Jeppesen Marine is a market-leading provider of vessel operations services and digital navigation solutions,

based on worldwide vector chart data type approved to ISO19879, meteorological information and transmission technologies. Jeppesen corporate information is available online at www.jeppesen.com.

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