

New Chart Production System with Cartography in Source

Executive summary

The previous chart production system at SMA was in use for more or less 25 years. After a public procurement 2015, a contract was signed with Teledyne CARIS in November the same year in order to deliver a new system for chart production. The new CARIS HPD system was taken in production in October 2016. ENC's were produced within weeks from production start-up, but the paper chart production is much more resource consuming to restore. All necessary cartography needs to be re-created more or less manually. The first paper charts, produced from the new system, was published in August 2017. However, thanks to a new concept called Cartography in source, cartography is stored once, together with other source data and can be reused for all other cartographic products needed.

Background

Teledyne CARIS' Hydrographic Production System (HPD) was successfully implemented as the new Chart Production System at SMA during 2015-2017. This replaced the previously used legacy software employed by SMA for more or less 25 years. HPD supports the creation of paper-, small craft-, electronic- charts and special publications and data services.

The project known as 'CHAMPS', included system customization and development, existing data and product migration, training of SMA's project team and end users. The implementation project was completed and approved on time early February 2017. Official products have been published with HPD since the production start-up on November 2016. This paper explains the concepts of cartography in source and why SMA is using it.

SMA Products

SMA's product portfolio holds 580 ENC's which by many is considered as the main product for the future. The number of ENC users is increasing with approximately 15 % yearly and the number of ENC's sold is increasing with 13%. At the same time, SMA still needs to publish paper charts to a market that for many years have been decreasing and now seems to have settled to a low but stable level.

Multiple Cartographic products

Besides paper charts, SMA's portfolio consists of a number of other cartographic products:

- small craft charts
- tiled raster data
- passage planning charts
- Pilot examination charts
- Advertising products...



Figure 1: SMA's Small craft charts are based on paper charts and holds traditionally the same cartography.

The common dominator for the cartographic product range is that they originally was based on SMA's set of paper charts (which holds cartography) but have a filtered or added content to suit the end users varying need. Some of the cartographic products are mainly created as an internal service for Pilots etc. but the small craft charts has become an important income over the years.

Traditional enc-, and chart production

Traditionally, chart production systems including HPD, uses a seamless source database where data that can be considered as product independent is put. Traditionally cartography like text placement, rotation of symbols or sector lights is not compiled into the source database.

To create a product, the system facilitates product editors where the user defines the product (name, extent, projection etc.). When the the product has been defined, the editor cuts data from 'Source' which usually is divided into different scale layers (in HPD called usages).

Traditional cartography compilation

Since cartography isn't normally part of the source database, compiling cartography is done for each individual product. This can be a very time consuming process and raised major concerns from the SMA management during the Champs project. The large portfolio of cartographic products with important income from small craft charts was thereby threatened by this time consuming process.

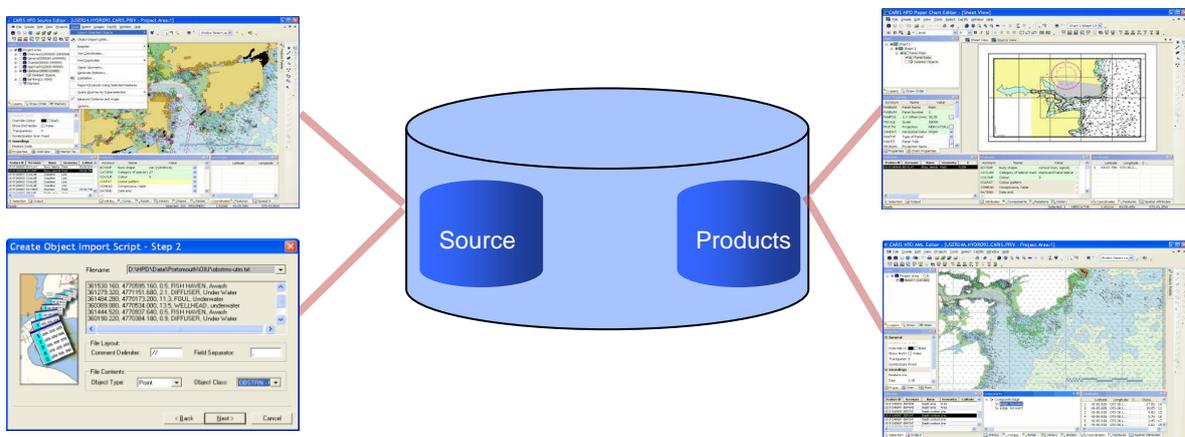


Figure 2: Cartography is traditionally compiled and stored in each product. (Screenshots from Teledyne Caris HPD)

Requirements on recyclable cartography

To address the concerns of the time consuming process to create multiple cartographic products, SMA added requirements regarding recyclable cartography to the tendering documents of the Champs project.

Cartography in Source

During the implementation phase of the Champs project, Teledyne Caris studied the product portfolio and the concepts of SMA's old production system. At the end of the design phase, Teledyne Caris presented what they called Cartography in source.

The concepts of Cartography in source means that text placement, rotations of symbols and sector lights etc. now also can be stored in the seamless source database.

HPD 3.2 -the Champs release

HPD 3.2, released in september 2016, met the requirements of the Champs project. All new functionality is also available to all other HPD customers with a subscription. The most important new functionality from SMA's point of view was:

- Added support for cartographic features in Source usages
- Added cartographic tools to Source Editor
- Added support for Tiled raster products (from source)
- Added support for Atlas to create chart booklets

All this functionality meant that there was added support to create all cartographic products from a COTS software and also that SMA could recycle cartography when compiling multiple or overlapping products from source.

Migration of data

To be able to start using the new system, data and products had to be migrated from the old system to HPD.

ENC first

Different migration strategies was discussed with Teledyne Caris but soon it was decided to use the existing ENC's produced with the old system as the main source of data migration. The ENC's was going to be batch imported very quickly.

The main benefits layed out was:

- fast migration using built in S-57 import functionality (two hours, 579 ENC cells)
- high level of Quality control of the migrated data, data could be compared/tested before and after import.
- short production stop due to fast and reliable migration.

The disadvantage however was that no cartography was going to be migrated along with the ENC's since ENC simply doesn't hold cartography.

Cartography migration project

It was clear that cartography migration was going to be a more or less manual- and a very time consuming process. SMA's in-house developers managed to migrate a few cartographic themes like land *region names* and *soundings out of position* but most of the cartography had to be handled manually.

Restoring and publishing products

To be able to publish products from HPD using the data that had been migrated, the product definitions needed to be defined in HPD (restored).

ENC's

Restoring the product definitions for ENC's was not considered time consuming and was done manually by the regular ENC operators. The first official 'HPD ENC' was published just a few weeks after production startup.

Paper charts

The paper chart products was considered much more time consuming to define. Because of resource shortage, that process was outsourced to Teledyne Caris who defined all 117 paper charts working from remote desktop in Fredricton, Canada. The first paper charts from HPD was published in August 2017. Three more New Editions were published later 2017.

The cartography migrations plan is to finish its work during 2018, which will gives SMA the prerequisites to publish any chart needed from HPD.

Small craft charts

As a result of the new functionality cartography in source, SMA was able to start restoring and publishing small craft charts in parallell with paper chart production using the same cartography as from the paper charts. During the fall of 2017, right after the first paper charts were published, the first small craft chart was created from HPD (A3-sized booklet, ~60 pages). In February 2018 two additional small craft charts was published (!).

Conclusions

The Champs project has been a success story where an old production system has been replaced by a COTS system capable of producing paper-, small craft-, electronic- charts as well as special publications. In a market where electronic products sell more for every year and paper charts have decreased to a steady but low level, SMA thinks that cartography in source can motivate the continued production of cartographic products.

Cartography in source can be reused for:

- overlapping Nautical charts in same or similar scale
- other cartographic chart product (small craft charts, tiled raster data, Pilot examination charts...)

Cartography in source also opens up for a simplified workflow where cartography can be updated continuously along with source data.