NHS – MINTEC, Print on Demand

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SUMMARY

In 2005 Jeppesen was awarded a contract from Norwegian Hydrographic Service (NHS) to deliver a new production environment for ENC's and paper charts, the "MINTEC contract". This contract was completed in June 2007. As an extension to this contract NHS requested a Paper Chart Print On Demand (PoD) system, allowing them to automatically extract print ready PoD Charts, for distributed via their PoD Agent network.
The MINTEC system allowed NHS to keep their paper chart products updated on a "daily" basis.

Jeppesen established a dKart Paper Chart Product Generator, which automatically extract defined paper charts from NHS's product database and compile print-ready products in PDF file format. The PoD service is a biweekly process running in conjunction with the NHS NtM releases. The process has built in verification and integrity checks, ensuring that any PoD charts created are updated correctly. Any products not meeting the acceptance steps, are highlighted and reported so that an operator will resolve the reported issue and forward it again for PoD extract.

All activities are logged and archived, allowing full traceability of all defined actions/steps as well as allowing NHS to repeat any previously completed extract. The extract mechanism also supports "Update/Change extracts" allowing the user to extract changes only.
The PoD charts, currently appr. 147 paper charts from NHS's Main chart series, is then provided to their PoD Agents for printing and distribution. Each PoD Agent will have to undergo and complete a pre-qualification of their NHS PoD service.

Key words: Print on Demand, PoD, Paper charts, NtM, Maintenance, Updates, Product generator, PDF, PoD Agents.

1. INTRODUCTION

The Print On Demand contract was established as an amendment to the existing MINTEC contract, scoped within a Standard Governmental Purchase agreement from the Norwegian Government.

For Jeppesen the responsibilities included:
- Project Management
- Installation and system tuning
- Systemization and development of new technology

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- Systemization and development of NHS Specific elements/technologies
- Test & Acceptance processes (continuous process)
- Quality system monitoring
  incl. risk analyzes throughout the project

NHS and Jeppesen agreed on a Project Mandate, where each requirement was clearly defined and scoped. Risk assessment and mitigation steps were defined for each requirement.

In short the Project Mandate/Charter defined following main focus points:
- Establish an efficient technical solution for automated extraction, conversion and establishment of Print Ready paper chart portfolio.
- Production and Maintenance to continue independent of the PoD service
- Process to be synchronized with bi-weekly NtM releases
- Support Scheduled or ad-hoc/on-demand extract
- Multiple template support
- Automatic paper chart compilation
- Support "Print Ready" PDF format, with Encryption and data security
- Support for GML and GeoTiff
- Full traceability and logging of events
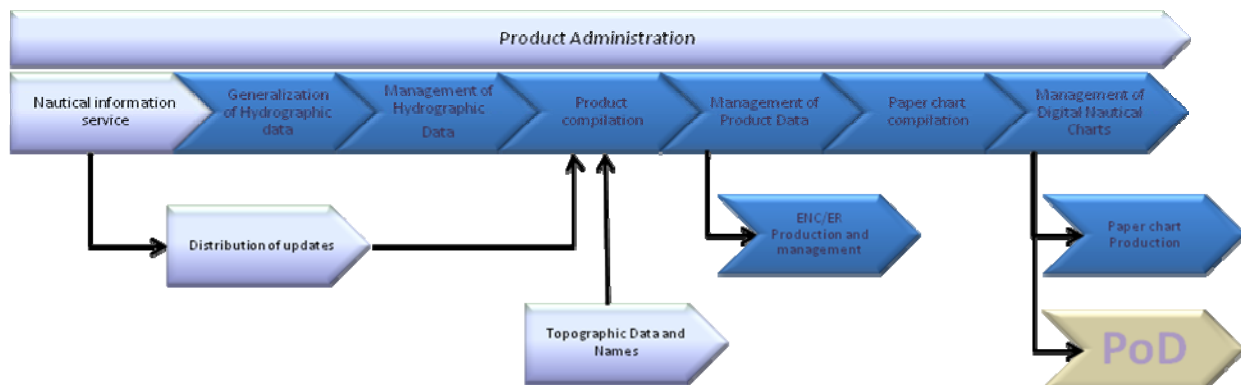
2. THE PoD PROJECT

2.1 Establish needed specifications

NHS together with Jeppesen defined comprehensive specifications which would allow NHS to meet the requirement put forward in the Project mandate.
This specification effort was a combined effort as Jeppesen have detailed knowledge of the underlying systems and their capabilities as well as Jeppesen have the expertise to recommend a solution which would work most effectively.

The specifications defined covered dataflow, data formats, production criteria's, export routines, export procedures and traceability of exports. This together with PDF export format definitions, including encryption and security, the specification was approved by both parties and put forward as the working document.

2.2 Organizational issues and requirements

Jeppesen have had a strong focus on the organizational directives/guidelines expressed by NHS throughout the entire project.
The guidelines from NHS were that the PoD Process should be a separate process fully integrated with the live-product database. Normal product production and maintenance would operate as a separate production process.

This provided the wanted flexibility to the organization, enabling easy workload transition when production priorities changes.

The system provided is COTS based and will fulfill the majority of the processes defined by/for the hydrographic office.

Even though the dKart Paper Chart product Generator is COTS based and uses presentation and resources from installed paper chart presentation libraries, it became clear that there were a number of bespoke requirements which needed attention. This would also relate to minor changes to the production workflow and procedures established in production.

These were issues relating to:
- Structure and buildup of a full and complete paper chart sheet, incl insets and continuations
- Masking handling for chart elements
- Paper chart element hierarchy
- PoD Frame elements
- PoD Agent Logo handling
- Metadata and logging definitions
- Formats and formatting parameters
- Default values vs. selective parameters

The PoD system is defined to run on both National NHS INT1 standard charts, as well as for INT1 charts. There are no system limitations for which charts may be added/included into the PoD service, this is solely at NHS's own discretion.

2.3 Systemization and tailoring

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The main focus was on defining the workflow line and processes (and sub processed) making the extract run optimally, wrt speed and quality.

The PoD system was defined to be an extension to existing production environment, yet fully integrated. This imposed some additional verification steps during export, e.g. aborting charts currently "in process" by any operators.
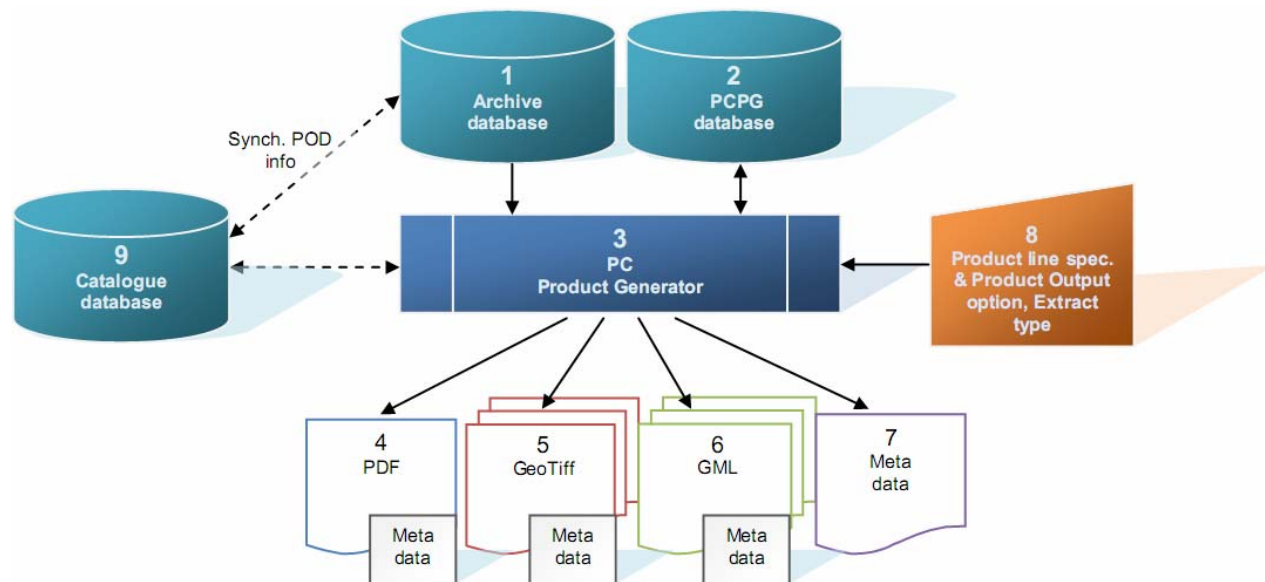
(1) Product Database, (2) PoD logging database, (3) Application/GUI, (4-7) Extract formats and metadata, (8) Product line definitions, (9) Digital Product Catalogue database.

NHS had a request that each approved PoD agents logo would be stored in a defined folder, and each logo should be included within the PoD frame for each chart. Each logo will create an individual logo layer in the PDF file, which are the only layers that are editable.
All cartographic and chart elements are defined in a separate, locked layer, ensuring that no cartographic elements may be altered or changed.

The system is defined to run as both an ad-hoc/on demand process or as a scheduled task. When the procedure is started it will process all charts defined for export and where violations are detected, against validation rules, the product processing will report the error, abort and then continue to next chart.

The system also defines the number of procedures to be used, enabling a highly effective process where complicated routines will run at an acceptable speed.

2.4 Building PoD charts

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2.4.1 Product line definition

The "Product Line" definition is where the operator defines which products to extract. In essence the Product line consist of a set of parameters queried from Product Archive and "The product line" is stored and any extracts made to it will be logged and archived for traceability purposes.
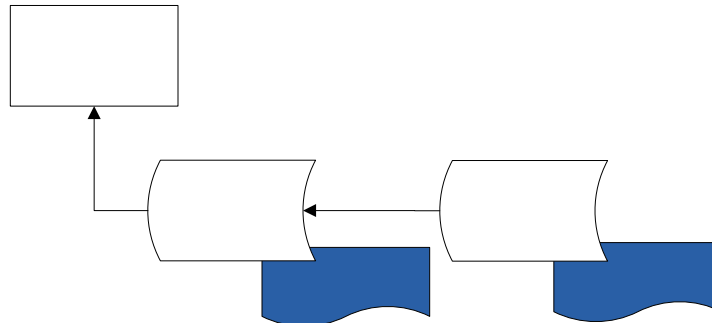
The "Product Line" is then selected by the Product line Task manager, where extract format, extract parameters and security settings are defined.

If a "Product line" has an earlier extract, Base (full) extract, the operator will also now define if a new Base or an Update or Change extract is to be done.

2.4.2 Extract settings

The Extract settings defines the full extract format, how the end product is to be compiled and and using which security settings.

For PoD charts the following main parameters may be defined:

Output format		PDF (defined PoD format)
Output folder		Folder to store extracts
Output structure		Inset handling
Output format parameters	Version	PDF Version, 1.5, 1.6 etc.
	Frame	Standard INT2 frame OR PoD frame
	Color model	CMYK or RBG
Logo storage		
NtM Details	NtM Booklet ID	NtM Booklet number/year
	NtM Booklet data	NtM Booklet release data.
Encryption	Use encryption	Yes/No
	Encryption type	128 bit RC4
	Master password	Define master password
	User password	Define a user password

Produc
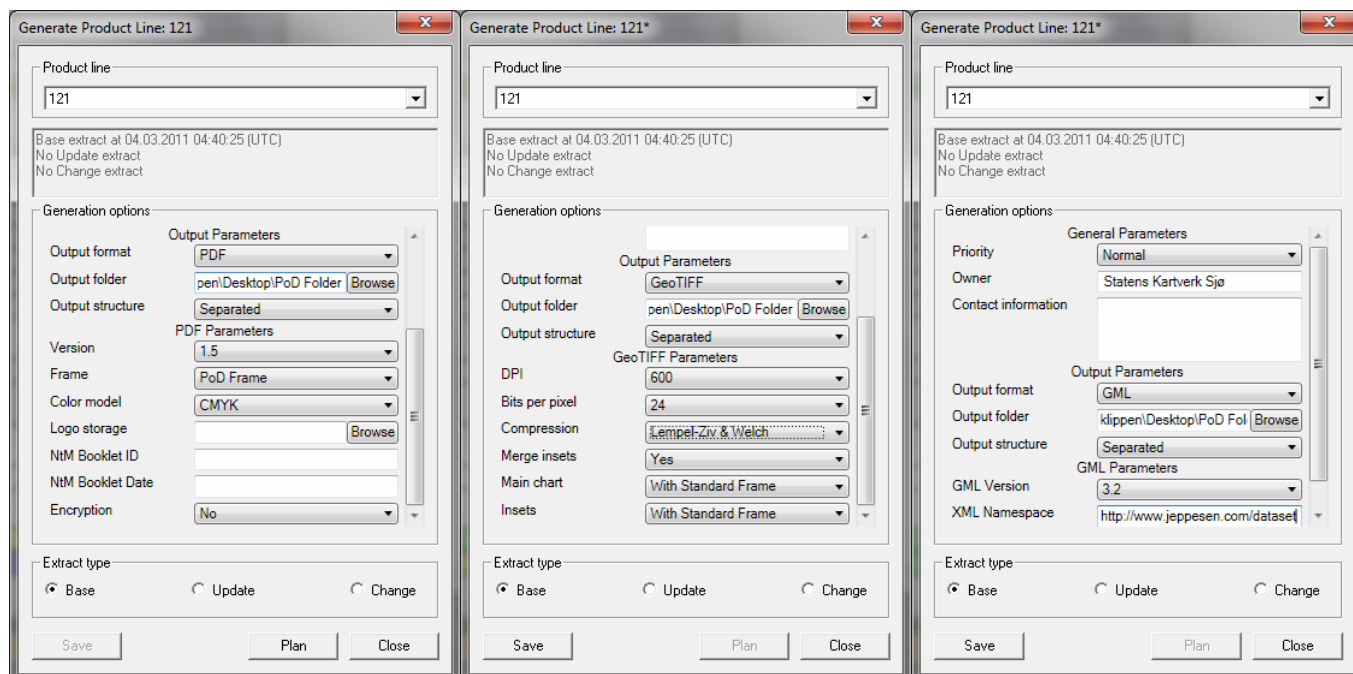
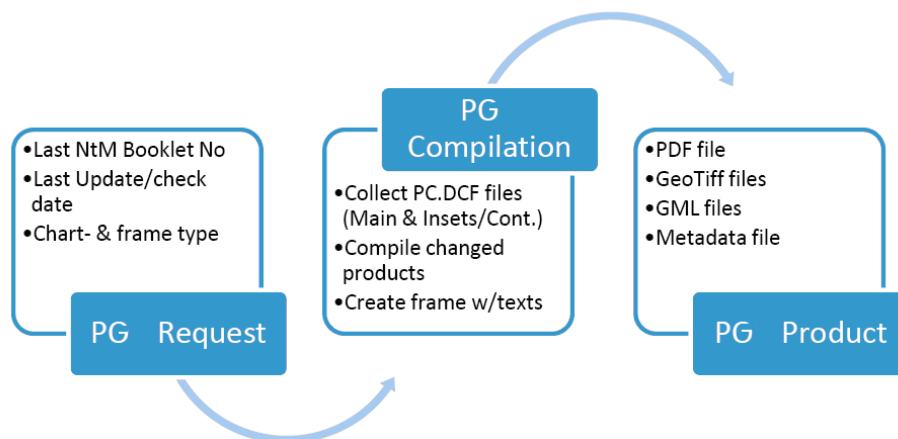### 2.4.3 Compiling the "Print ready" product
To run a defined Product Line the operator clicks "Plan" once mandatory attributes are defined.

The Plan status allows the operator to start the extract imidiately or on a schedule time.

2.5 Running PoD extracts

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The PoD Extract will run through each chart in the Production Line, this refers to each Main chart.

Main charts, with main chart elements, will be collected from the product archive and processed to the defined format given by defined parameters.
Where a Main chart has insets each Inset, with inset chart elements, will be collected and place as defined on the main chart.

Frames, out frame elements, images etc are all pre-defined and handled with full automation.

An example below of a completed PoD chart:
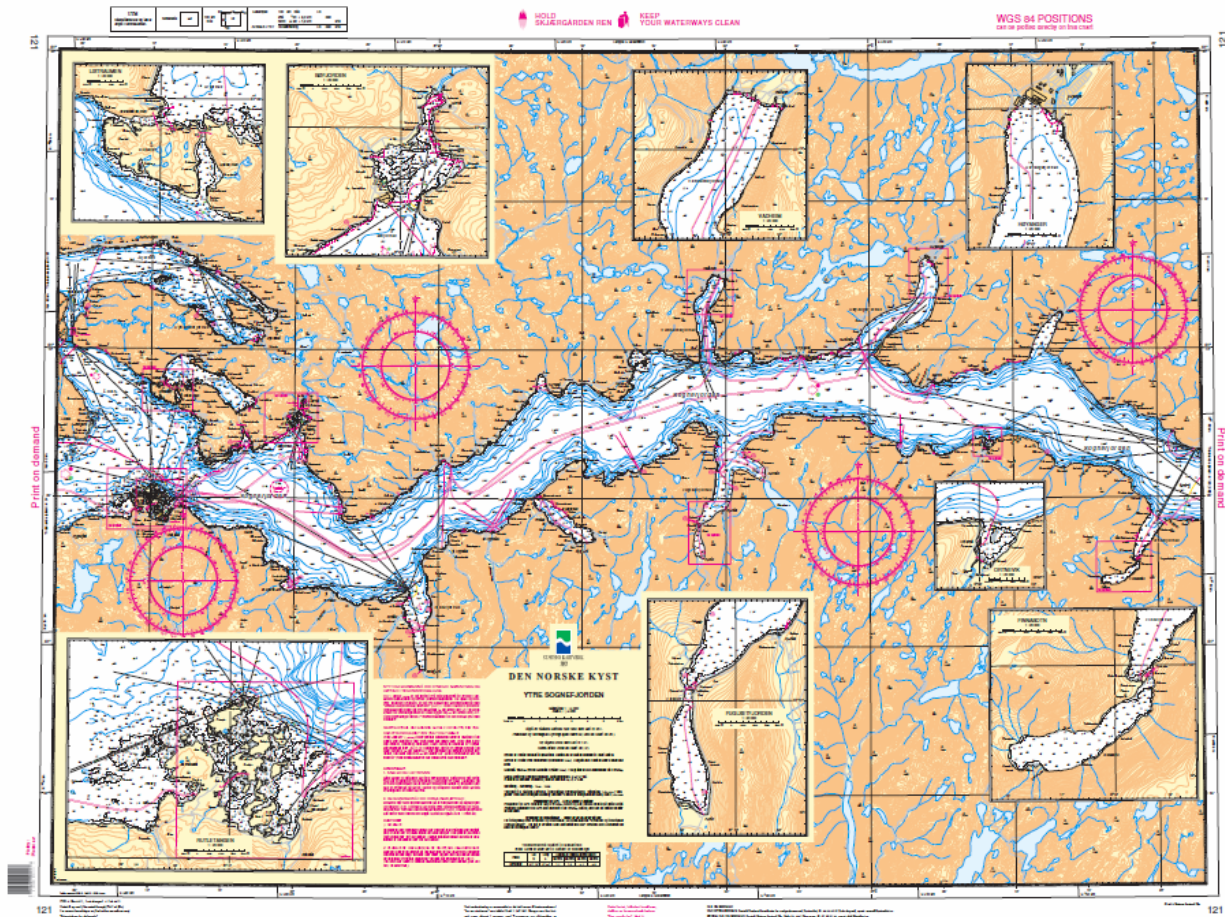
The full paper chart consists of:
1. Main chart, incl. 3 chart element files (such as Frame, Out frame, barcode graphic etc)
2. 8 Insets charts, which each have a frame, masking border and other chart elements

2.6 Verification and logging
The process requires various validation and successful criteria to be met before a chart can be extracted as a PoD chart.
Including e.g. checks for Chart status, In-process locking, Chart element accessabillity (all referenced elements), NtM date etc.

The NtM Booklet Data serves as a "knock out" date and must be met.
This date is validated against Last Update date (LUD) or Last Checked date (LCD) of all charts, including inset charts. All PoD charts MUST have a LUD/LCD date equal or newer than the NtM Booklet release date. Any charts not meeting these requriements will be removed from the extract and highlighted, with error descriptions, as "Unprocessed".
Once the reported issues are resolved the PL can be re-run, and by default "Unprocessed" charts will now be selected for extract. Again the same tests will be carried out on the charts ensuring that they now meet necessary requriements.
All files are extracted to a selected folder and stored in a structure that defines ready products.
Each extracted chart is logged, collecting update information, version/edition information, if its a master/slave chart and if it has any actual update or just new LCD etc.
Metadata is created and saved for each product as well as for each extract.
Metadata report format is XML based.

3. DISTRUBUTION
NHS have defined a pre-qualification process where each Agent has to undergo a Proof of system test. This includes proving the PoD system the agent will be using, incl. Ordering and production processes, hardware and ink to be used etc.

The agent will collect the entire PoD portfolio from NHS and put them into production immediately.
The only tasks required by the Agent is to update their chart catalogue with latest metadata snapshot and turn on visibillity on their logo so that it appears on the printed chart.

REFERENCES
No external references included.

BIOGRAPHICAL NOTES
John K Klippen started working for C-MAP Norway AS in 1994. From 1997 and onward he have been responsible for evolvment and development of dKart Office product portfolio, through HydroService and today Jeppesen.
John Klippen have been the lead for a number of contract and deliveries to many hydrographic offices around the world, covering from simple license installation to full featured hydrographic production environment.

CONTACTS

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