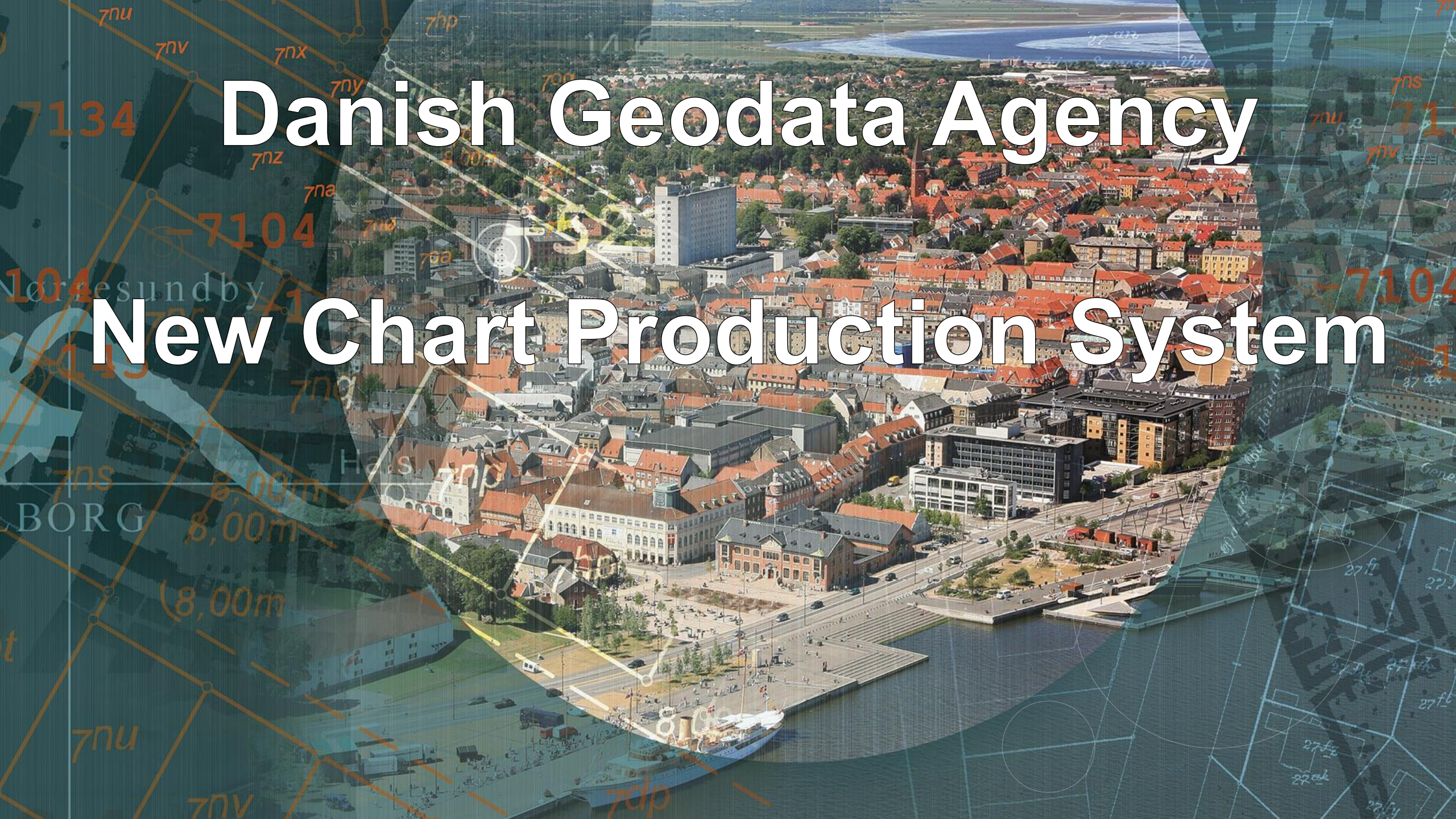
Danish Geodata Agency
New Chart Production System

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- Background
- Proces
- Status now
- Road ahead
- Lessons learned
- Points for discussion

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Why a new production system?

GST production in 2016

- Product centric and file based production in the Danish waters, database based production in Greenlandic waters
- Two entirely different production systems – Caris in Danish waters, Esri in Greenlandic waters

Main goals

- One production system for ENCs and paper charts for all of GST's geographic areas
- An efficient production system, where redundancy and manual steps are minimized
- A production system prepared for a data driven production flow

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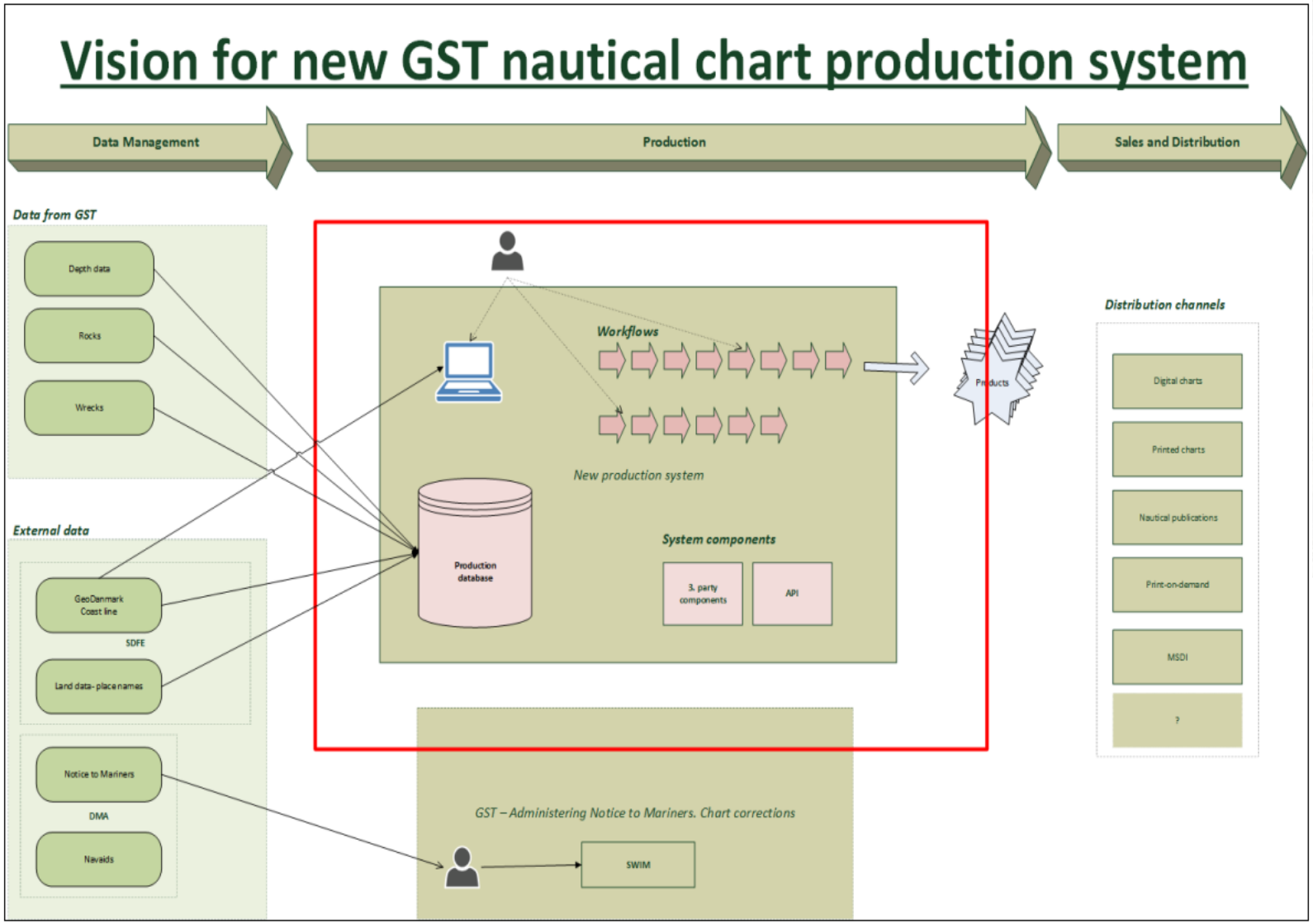
Vision for new GST nautical chart production system



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Publishing

Contract signing

2016	2017				2018				2019
Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Analysis and writing the tender							Evaluation		

- Appendix 0 Background and scope.pdf
- Appendix 1 Time Schedule.pdf
- Appendix 2 IT Environment.pdf
- Appendix 3 Delivery Description.pdf
- Appendix 4 Documentation.pdf
- Appendix 5 Maintenance and support.pdf
- Appendix 6 Service level goals.pdf
- Appendix 8 Termination services.pdf
- Appendix 9 Change Management.pdf
- Appendix 10 Governance-project organisation.pdf
- Appendix 11 Customers Participation.pdf
- Appendix 12 Delivery payment and payment schedule and c
- Appendix 14 Tests.pdf
- Appendix 14, attachment C Operations providers operations
- Appendix 15 License terms.pdf
- Appendix 16 Corporate Social Responsibility (CSR).pdf
- Appendix 17 Data Processing Agreement.pdf
- Appendix 17_Data Processing Agreement_Kontrakt_Undersk
- Appendix 18 GST Information Security Policy.pdf
- Appendix 19 Question and answers during the tender proce
- Appendix 20 List of requirements.xlsx

ID	Description
MR 3-1	The Application must be a standard system that is designed for nautical chart production.
CR 3-2	The Application must support the Customer's nautical navigation chart production by using standard functionality within the Application and with a minimum of customer specific development/ajustment
MR 3-3	The Application must at least support paper chart, ENC and AML (Additional Military layers) production for the three geographic areas Denmark, Faeroe Islands and Greenland.
MR 3-4	The application must be data centric which means that data is stored and maintained in a production database and that Products are derived from or linked directly to the production data.
MR 3-5	The Application must be efficient at producing new and updated Nautical Navigational Products (paper charts and ENCs). Efficient means that the Application must be configured in a way so unnecessary work routines are avoided without compromising the quality and safety.
MR 3-6	The System must be user friendly which means that the user interface is logically build and that tools, functions is easy to locate and use
MR 3-7	The Application must have an open API allowing for connections and interactions to other systems, data sources and components, allowing for integration to other systems.
MR 3-8	The Application must have an open API allowing for connections and interactions to other systems, data sources and components, allowing for automation of import and export of data
MR 3-9	The Application must support current IHO (International Hydrographic Organisation) standards related to chart production and data management.
CR 3-10	The Application must support future IHO standards related to chart production and data management
MR 3-11	The Application must support current ISO standards related to chart production and data management. The ISO standards the Application must support are: The ISO 19100 series referred to by IHO as used in the S-100 framework. The ISO 8211 standard, incorporating ISO standards 646, 2022, 2375, 6093, 6937, 8859 and 10646 as used in the S-57 framework. The ISO standard ISO 19125-1:2004 as used as a basis for the development of the S-58

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Proces

- Contract signed Jan 2019
- Design and Planning phase February - June 2019
- Implementation phase June 2019 – Dec 2020
- Operations phase Jan - June 2021
  - Start of production April 6th 2021
- End of project June 29th 2021

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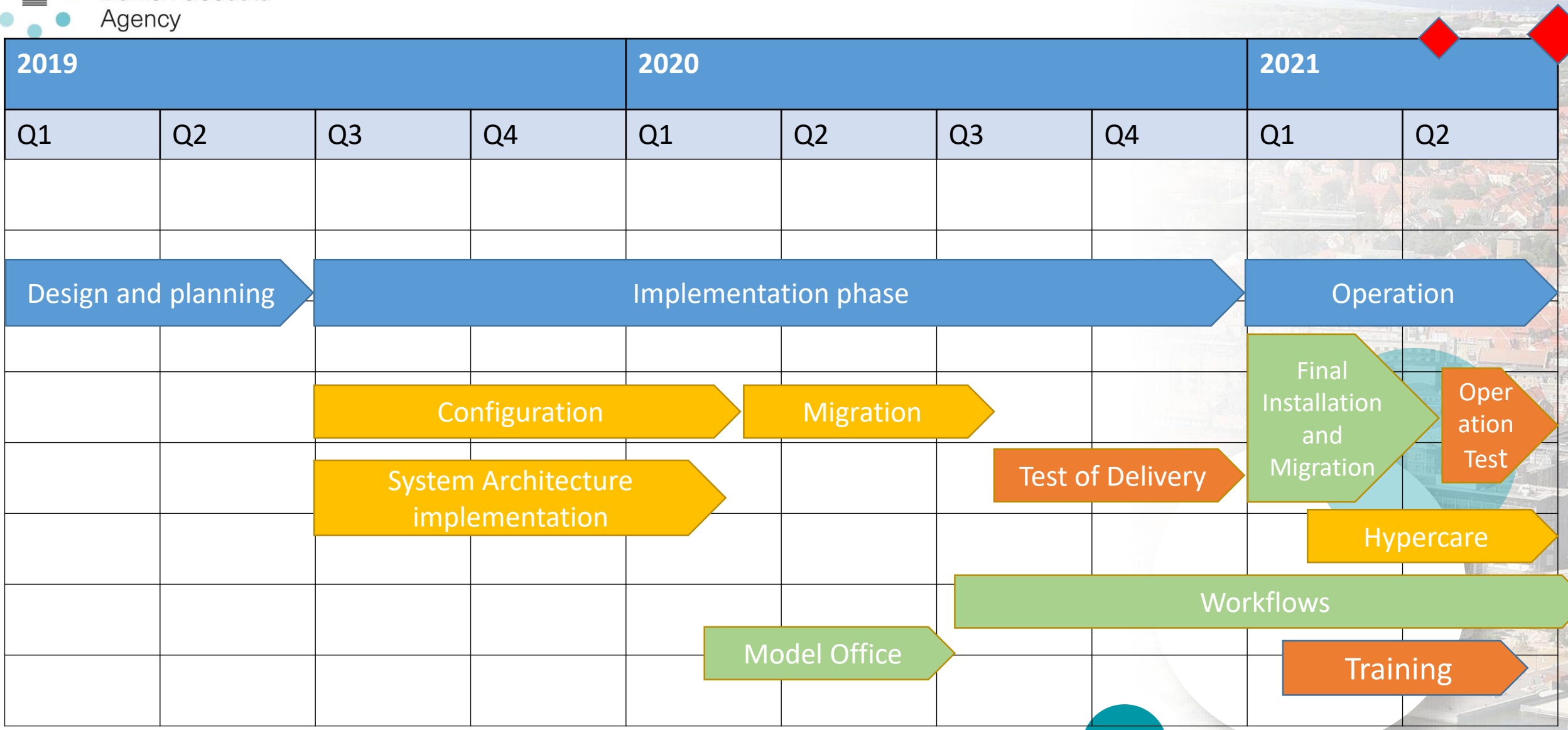

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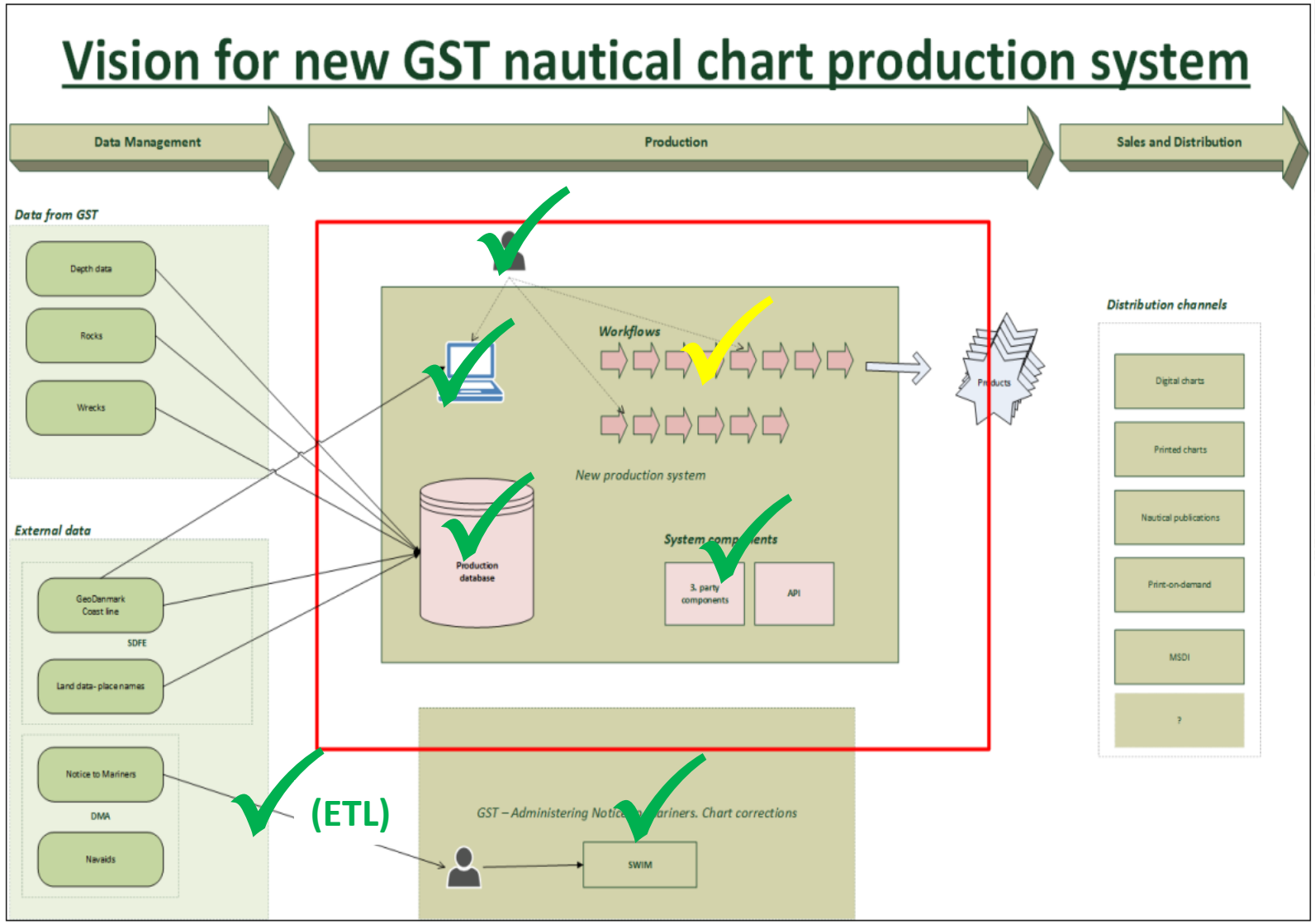
Vision for new GST nautical chart production system
Data Management
Production
Sales and Distribution
Data from GST
Depth data
Rocks
Wrecks
External data
GeoDanmark Coast line
SDFE
Land data - place names
Notice to Mariners
DMA
Navaids
Workflows
New production system
Production database
System components
3. party components
API
Products
Distribution channels
Digital charts
Printed charts
Nautical publications
Print-on-demand
MSDI
?
(ETL)
GST – Administering Notices to Mariners. Chart corrections
SWIM

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Cost?

Total cost of the project: ca 47.7 mio DKKr

Internal ressources: ca 26.3 mio DKKr

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Now what? (status Q3 2021)

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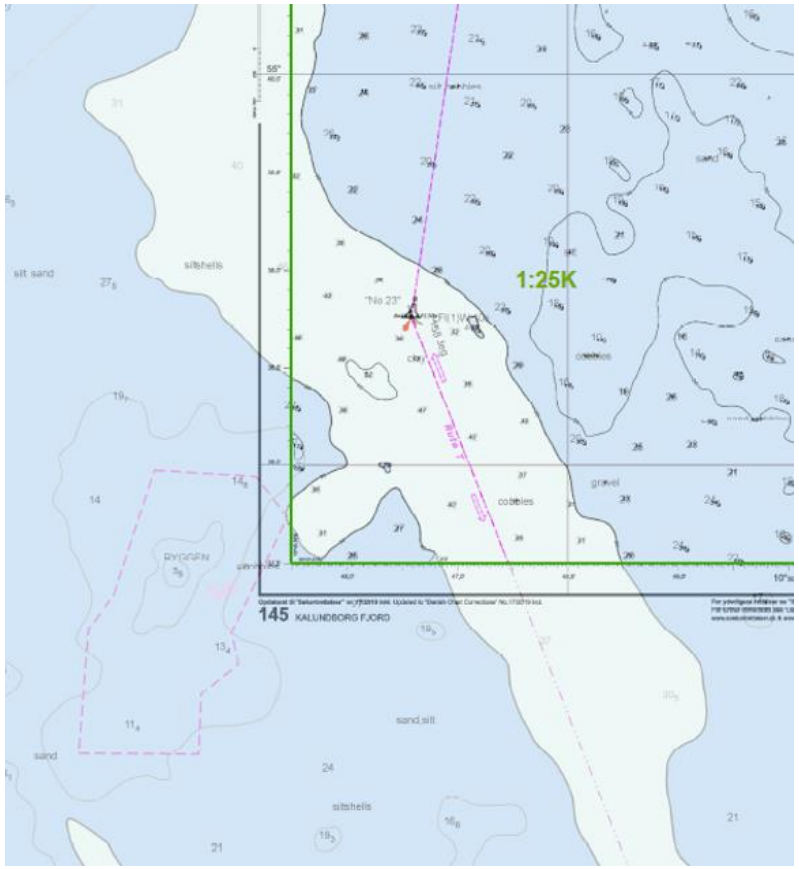
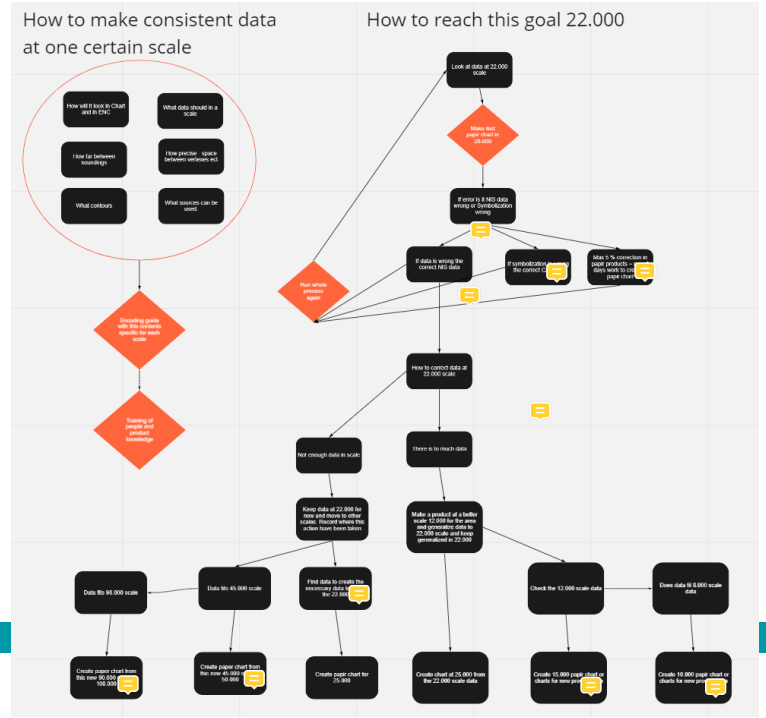
Competencies

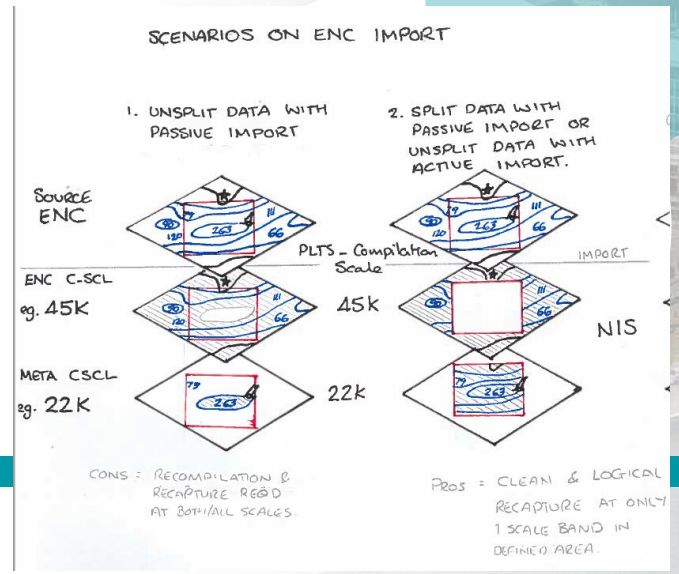
- Master the new system
- New ways of thinking – from product centric to ‘hydro spatial’, while still making sure that we can deliver the right products
- Understanding how data is stored in the database and how it will be depicted in the products.

Data management (clean up)



- Lack of coverage - Data has been produced for specific products, not as ‘source data’
- Existing data has been digitized from raster charts in the 90’s and are not always captured in the relevant scales.
- Different scale bands in the ENCs need to be handled in the database m_cscl





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Products

- We need to change our way of thinking. Paper and ENC products are derived from NIS data (database). So we need to produce data consistently to specific scales.
- Review our product portfolio – we cannot maintain the current product portfolio in an efficient production. Scale bands and coverage need to be revised to better correlate with data in the database. Look at our customer needs?
- Customized symbology needs to be standardized (change tradition). Get closer to INT 1 and S-4 specification.
- Looking more to using data for other uses than navigational products.

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Road ahead

- Rescheming – working towards gridding our data. Needs to be harmonized with neighbouring countries.

- Prepare for S100
  - Producing to both S-57 and S-101
  - S-102
  - Other S-100 data and products

- Investigating which data scale we want to produce in. Working towards a 1:22.000 ‘basis data theme’

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Lessons learned / challenges

- EU tender is complex and may not be the best framework in this kind of tender

- The project became the catalyst for:
  - Organizational change (the Danish HO went through a major organizational change during the project, which added to the complexity of the project)
  - Defining our processes
  - Cleaning up our data

- Project management was part of the tender. If we had wanted the project to be on time, we should have hired an external, independent PM to drive the tasks.

- There was a lack of alignment after the Design and Planning phase that caused problems in the implementation phase. There was a hard deadline on this phase due to contribution from FAMOS.

- We asked for a standard (out of the box) product. Maybe this was not realistic.

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Lessons learned / challenges (cont'd)

- There was an expectation that the supplier could deliver extensive best practice guidelines on production processes and workflows. This was not the case.
- A 'Model Office' which opened up for early hands on and a more agile proces worked well. This should have been planned from the start. Especially since there was a need for more configuration and adjustment than expected.
- As we are a relatively new organisation, the DGA was challenged on sufficient domain knowledge
- The organisation was not fully prepared for many of the decisions that needed to be made during the project
- It is a huge challenge to run a project like this while maintaining full production
- It is challenging to create paper charts from a nautical database and to recreate cartography from existing products.

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Points for discussion

- DGA is considering producing a ‘base’ data layer in the scale 1:22.000. Are there any thoughts on this? Would it be realistic with a 1:22.000 data layer that is harmonised across the borders?

- DGA is considering gridding ENC’s in the interval 1 degree, ½ degree and ¼ degree, as a preparation for S-101. Is this resonable, and is it something that could be worked on together?

- DGA will reduce the different paper chart scales. The proposal is to only produce paper charts in 1:100.000 and to focus on digital products for other scales. Could this be discussed in eg. BSICCWG?

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The project is now closed, but we are only at the start of a major transformation of our production.

It is ‘easy’ to change the software – the main difficulty is to change procedures and ways of thinking.