

NHC 64<sup>th</sup> Meeting Virtual 20 + 21 April 2021 NHC National Report NORWAY

# NATIONAL REPORT NORWAY

# **Executive Summery**

This report gives the summary of the activities and events that have taken place within the Norwegian Hydrographic Service (NHS) since the last report given at the NHC63 Conference in Helsinki, April 2019. Some highlights:

- New organizational structure
- Pilot project for Marine Base Maps in Norway
- Digital Nautical Publications
- New Hydrographic Infrastructure
- Continued high activity in the Mareano project in both coastal and open sea arctic areas
- COVID-19

# 1. Hydrographic Office

2020 has been yet another eventful and challenging year for the Norwegian Hydrographic Service (NHS), and indeed for the entire Norwegian Mapping Authority, of which we are a part. 2020 started as normal, but in March, Covid affected us in Norway as it did the rest of the world. As of March 13, we went in to a national lock down in Norway. At the NHS we were all sent home, our survey vessel M/S Hydrograf was ordered to port, and the crew sent home. The next few weeks were quite chaotic. Not all of our employees were able to work from home. Some of our production systems were not adapted to working online, and some of the data we handle are subject to restrictions making it illegal to work on them via the internet. Our IT department and some of our software suppliers worked around the clock, and within a matter of weeks our production line was operational again albeit at a slightly reduced rate. A gradual return to the office was planned for August, but due to a flare up in Covid cases after the summer holidays, the return was postponed, and as of October, most of our employees have again been working from home. As of April 2021, due to several Covid flare-ups, we are still working from home. Our national vaccination program is progressing steadily, and according to the reopening plan, we hope that everyone will be back at the office in August.

A new director-general to The Norwegian Mapping Authority (NMA) was appointed last April. After serving for two terms, our former director-general Mrs. Anne Cathrine Frøstrup retired, and our new director-general Mr. Johnny Welle took over. One of the first activities Mr. Welle has initiated is the formation of a new strategy. All four divisions have been involved in this work, and a team of dedicated and experienced representatives from all parts of the NMA was established to support management in their work. This group has among many things, been tasked with conducting a PESTEL analysis for the whole organisation. The PESTEL analysis has served as input for the strategy process.

#### • Organisational changes

2020 has also seen some organizational changes in the NHS. The new adjustments have mainly been initiated because of two factors: firstly the positive experiences we have had with the Nautical Charting Authority department has led us to also consolidate the roles managing the requirements related to bathymetric data and marine spatial infrastructure into a new department. In this new department we have located all roles managing requirements and user input to all of NHS's products and services, and this will further ensure that the NHS focuses its resources were they give the highest benefits to society. It will also take some of the burden off the production line, as they will have clear requirements governing their everyday tasks. Secondly, we are preparing our production for the technological changes that will follow in the wake of the New Hydrographical Infrastructure project (Nautilus). The emergence of new technology will challenge the way we have organized the production line today, and some of these changes will demand a lot from all employees at the NHS. In order to manage the transitions in the best possible way, we will now merge all of our production into one department.



As of April 2021, all departments managers have been appointed, the departments have been staffed, and we are working on implementing the new structure. Responsibilities have to be appointed, procedures have to be updated and offices moved.

#### • Marine Base Maps

The pilot project is well under way. The project team has been staffed with representatives from the HNS, but also from the Geological Survey of Norway. Mapping, both bathymetrical, geological and biological has during 2020 been completed for two of the three project areas according to plan.

The main focus this year, apart from the milestones in the project plan, is the work on a proposal to government for a national marine base map program. In 2021 we have conducted drone carried Lidar trials at Fjøløy near Stavanger, and we are currently conducting joint survey operations with our project partners in Skjærvøy north of Tromsø.

#### • UN-GGIM

In June 2020 a UN report, written by a group of independent experts, was published. The report "White paper on Readily available and Accessible (Open) Marine Geospatial Information" mentions Norway as a best practice example on how to organize a MSDI as well as a best practice on how to best utilize the content of MSDI in Marine Spatial Planning and resource planning.

## • Digital nautical publication

The new digital Pilot guide for Norwegian waters was launched in November 2019 by the Minister of local Government and Modernization. The digital Pilot guide has now replaced the former PDF version as the official version of the Norwegian Pilot guide.

## • New Hydrographic Infrastructure

In an effort to renew our digital production line, the NHS has launched a project named New Hydrographic Infrastructure. For 2020, we have hired a full time project manager, and our ambition for the project is to replace the current production system that was established in the late 1990.

#### • Covid economic support package

As a part of our government's relief plan for Norwegian businesses, the NMA received NOK 12 million earmarked for purchase of services from private industry affected by the national shut down. In the NHS we used these funds to expand and improve the contents and services in the new Pilot guide for Norwegian waters. In close cooperation with harbors, private survey and consulting industry and NMA regional offices, we have launched harbor-surveying project. Ten different harbors across all of Norway have been selected for this project. Private contractors are surveying the harbors, both onshore with Lidar and photography, and offshore with multibeam echo sounders. This gives a unique and complete picture of all features relating to harbors that are important to all parties involved in maritime operations. We are planning to make the data available to the public as high definition charts and services.

Due to Covid, we are experiencing some delays in the offshore surveys. Due to lock downs, operations in some areas have been hampered by lack of accommodation and general restrictions on movement in sand out of the regions. We are hoping that the hardest restrictions will be lifted soon, and according to our updated plan, all survey activities will be completed by the end of summer this year.

# 2. Hydrographic Surveys

#### 2.1 Internal conducted surveying 2020

During 2020, R/V Hydrograf and its two survey launches have been working in the coastal

waters of Norway. Due to the situation with Covid19, no Svalbard surveys were undertaken in 2020. The coastal surveying was also shut down for about one month.

#### Norwegian coast

The primary survey areas in 2020 have been fairway surveys along the southern part of Norway between Kragerø and Bergen.

In addition, some exposed areas north of Ålesund were surveyed as a part of the coastal marine mapping program.

The total area surveyed along the Norwegian coast in 2019 was 791 km<sup>2</sup>. *Figure 1* presents the coverage of surveying within the territorial waters.



Figure 1 Area surveyed in territorial waters during 2020. Please note that the area sizes are exaggerated to make the smaller areas visible on the plot.

#### Svalbard

There were no Svalbard surveys during 2020.

## 2.2 External conducted surveying 2020

The surveys within the MAREANO program were contracted to external companies. The 2020 MAREANO surveys were mainly conducted by Fugro Germany Marine GmbH, but some of the areas were surveyed by the Norwegian Defence Research Establishment.



Figure 2 Areas surveyed for the Mareano Program by Fugro Germany Marine GmbH in 2020

In addition to the Mareano surveys, some selected harbour areas along the Norwegian coast were contracted to the two private companies GeoSubsea AS and Norkyst AS.

#### 2.3 The MAREANO Programme

![](_page_5_Figure_1.jpeg)

Figure 3. Areas surveyed for the Mareano Program

# 2.4 Marine Base Maps in Norway

Marine Base Maps for the Coastal Zone, Norway is all about gathering detailed information and boosting the knowledge of the sea bed and marine coastal systems along Norway's coast - for a sustainable ocean economy. The aim is to provide new business opportunities, stimulating and optimising the growth of industries, better public administration and effective coastal zone management to benefit people, nature and the economy. Marine base maps in Norway will (i) map on a large scale the sea beds physical, biological and chemical environments (ii) analyse the data and (iii) distribute a set of standardised products in formats that would cater to the different needs of end users. The marine data collected is distributed as stand-alone or combined with other datasets to create "Marine Base Maps".

It is a cooperation project with 3 partners; The Norwegian Mapping Authority Hydrographic Service (leading the project), Geological Survey of Norway and the Institute of Marine Research. This cooperation allows for a streamlined process from data collection to distribution. It also has the added advantage of better coordination and management of resources.

We are running a pilot project in three pilot areas along the coast for a 3 year period 2020-2022. The budget for the 3-year pilot is NOK 84 mill. The pilot projects will investigate and test new technology for data collection and processing and, in addition, develop a cost-effective model for the implementation of a Marine base maps in Norway national program.

The surveys and data acquisition in two of the pilot areas are completed and the production of the terrain models, geological- and biological services are in production and so is the chemical environmental state services. The final pilot area is in the planning stage and will be surveyed in 2021.

Workshops have been held in three pilot areas with planning staff of municipalities and provinces, government agencies and industry / commercial actors. We have identified and documented planning processes in a way that shows what type of marine geospatial information is needed, what the user requirements are and what are the requirements for distribution of the data. In addition we aim to identify datasets that can become part of our official national geographical information baselayer (in Norwegian: DOK: det offentlige kartgrunnlaget) containing all official datasets required for planning and building processes in Norway. Once a geospatial information dataset is part of "DOK", it

- meets specific ISO-standards,
- is INSPIRE compliant
- is available in WMS, WFS and WCS, pluss has atom feed

• can be harvested from our national geoportal "Geonorge"

Parallell with the pilots we are working towards a national program: Marine Base Maps for the Coastal Zone, Norway and an investment proposal will be delivered to the Norwegian government in october 2021. A socio-economic analysis and uncertainty analysis is part of the scope as is fundraising from the users as the national program will be co-funded by the users.

# **3.** Nautical Charts

The Norwegian mainland coast is covered by ENCs and modernized paper charts. In the Arctic and Antarctic waters, there are still areas without any coverage. NHS has mainly been concentrating on replacing areas with old survey data with new data. NHS prioritize chart production based on safety of navigation and economic benefit to society.

## ENC coverage, gaps and overlaps

	Usage Band	Compilation scale	No of ENCs
1	Overview	< 1:1 499 999	3
2	General	1:350 000 – 1:1 499 999	70
3	Coastal	1:90 000 – 1:349 999	82
4	Approach	1:22 000 – 1:89 999	764
5	Harbour	1:4 000 – 1:21 999	217
6	Berthing	> 1: 4 000	67

The total number of Norwegian ENCs was 1203 at the end of 2020.

Table above: Number of ENCs in each usage band per 31 Dec. 2020.

![](_page_8_Picture_0.jpeg)

#### Figur 4

ENC coverage for the Norwegian coastal waters (ENCs in User Bands 2-6).

![](_page_8_Figure_3.jpeg)

#### **Figur 5** ENC coverage in User Bands 1.

In 2020, existing ENCs in several major- and most important fairways from Skagerak to Rogaland are updated with multibeam survey (Iddefjorden, Sandefjord, Larvik, Porsgrunn,

Mandal, Stavanger, Årdal, Saudafjorden). Also in small parts of other existing ENCs along the Norwegian coast old bathymetry have been replaced with new survey based on request from users.

In addition, new Coastal ENCs between 69°N, 4°E and 73°N, 26°E were produced as a part of the expansion of coverage in the Coastal user band along the Norwegian coast. General ENCs in the same area were updated.

In Svalbard parts of existing ENCs in Storfjorden, Freemannsundet and Widjefjorden/east of Moffen were updated with multibeam survey.

The updating via ER profiles were issued in accordance with the Notices to Mariners (NtM) and other updates, and distributed through Primar. A total of 2117 ER files and NE were issued as part of the continuous maintenance of the ENCs. Temporary (T) and Preliminary (P) notices are published as ER files. They are included in this number.

# **RNCs**

The Norwegian Hydrographic Office do not produce Raster Navigational Charts (RNCs).

# **INT Charts**

Norway has 21 INT-charts in the chart portfolio (per April 1<sup>st</sup> 2021). Most of them are smallscale charts (general and coastal charts). For the next years we plan to add 2 more coastal charts to our portfolio.

1 New Charts (INT) was issued in March 2021, Chart no 312 (INT 9315) Andenes - Lopphavet.

A total of 1 new editions of INT charts were issued in 2020 due to updates from new surveys. 1 coastal chart.

INT charts, new editions with new survey data published 2020

Chart No.	Title	Scale
1. 311	INT 9314 / Støtt - Andenes	1:350 000

# **National Paper Charts**

1 New Charts were issued in 2020.

A total of 40 new editions of national charts were issued in 2020 due to updates from new surveys. 8 harbour charts, 28 main charts, 3 charts for Svalbard and 1 coastal chart.

National charts, new editions with new survey data published 2020

Chart No.	Title	Scale
1. 1	Oslofjorden. Færder – Hvaler – Halden	1:50 000
2. 2	Torbjørnskjær - Fulehuk - Rakkebåene	1:50 000
3. 10	Ny-Hellesund – Lindesnes	1:50 000
4. 16	Tananger – Stavanger – Skudenes	1:50 000
5. 25	Sognesjøen – Stavenes	1:50 000
6. 30	Haugsholmen – Ålesund	1:50 000
7. 31	Breidsundet – Fjørtoft	1:50 000

Chart No.	Title	Scale
8. 35	Hustadvika	1:50 000
9. 36	Kristiansund – Kyrhaug	1:50 000
10. 37	Kyrhaug – Trondheimsleia	1:50 000
11. 38	Trondheimsleia. Terningen – Kyrksæterøra – Ørlandet	1:50 000
12. 40	Smøla	1:50 000
13. 46	Folda	1:50 000
14. 48	Gjæslingan – Dolmsundet	1:50 000
15. 56	Tjøtta – Dønna	1:50 000
16. 70	Røst – Værøy	1:50 000
17. 72	Lofotodden – Stamsund	1:50 000
18. 73	Ure – Gimsøystraumen – Svolvær	1:50 000
19. 74	Fuglehuk – Ramberg – Eggum	1:50 000
20. 75	Eggum – Gimsøy – Gaukværøya – Stokmarknes	1:50 000
21. 76	Stokmarknes – Sortland – Malnes	1:50 000
22. 77	Tjeldsundet – Harstad – Lavangen	1:50 000
23. 78	Hovden – Langenes – Risøysundet	1:50 000
24. 92	Karlsøy – Flatværet – Gåsan	1:50 000
25. 103	Måsøya – Nordkapp – Honningsvåg	1:50 000
26. 104	Nordkapp – Lille-Tamsøya - Sværholt	1:50 000
27. 126	Storfjorden. Ytre del med Hjørundfjorden	1:50 000
28. 139	Nordfolda	1:50 000
29. 305	Skagerrak	1:350 000
30. 455	Stavanger havn med innseilinger	1:25 000
31. 456	Ålesund havn	1:20 000
32. 466	Tromsøysundet – Sandnessundet med Tromsø havn	1:20 000
33. 470	Singlefjorden, Iddefjorden med Halden havn	1:25 000
34. 473	Langesund – Herøya	1:20 000
35. 474	Porsgrunn – Skien	1:20 000
36. 477	Farsund havn med innseilinger	1:10 000
37. 480	Larvik havn. Sandefjord havn	1:10 000
38. 532	Storfjorden. Kvalpynten – Aghardhbukta	1:100 000
39. 533	Storfjorden Nord.	1:100 000
	Freemansundet – Heleysundet - Sørporten	
40. 540	Hinlopenrenna. Moffen – Lågøya	1:100 000

**Other charts, e.g. for pleasure craft** NHS do not produce any other charts than the official paper charts and ENCs for navigation, but are distributing S-57-cells (derived from the official ENCs) for use in charts and maps e.g. for the leisure boat marked.

# **Challenges and achievements**

In 2020 NHS continued its cooperation with The Norwegian Coastal Authorities to make sure that all major- and most important fairways are covered with adequate quality bathymetry. One of the major tasks in year 2021 is to update charts with modern bathymetry in these areas.

Another important achievement is the expansion of coverage in the Coastal user band (band 3) along the Norwegian coast. The plan for 2021 is to finalize the production of coastal navigational charts in northern Norway.

The chart section has an ongoing project looking into use of dense depth contours in ENCs (high density ENCs). The first goal is to make a prototype ENC and then test the product among selected end users to gain experience. This project is a response to requests from the end users. Due to Covid-19 situation, the project was dormant in 2020. A major challenge in working with high-density bathymetry is the current Norwegian classification regime. The change of this regime is yet to be finalized. The new regime will most likely enable release of detailed depth information inside the 0-30m depth area.

# 4. Nautical Publications

The Norwegian Pilots Guide «Den norske los» was digitized and more customized for the professional users in November 2019. The Norwegian pilot guide is available for browsers and tablets as an webapp. The content is based partly on our charts and partly on georeferenced information from external partners and our own survey.

After The Norwegian pilot guide has been in use for a whole year, we can now see that we have an average of about 3000 unique users every month.

By digitizing the Norwegian pilot we had to develop a new national port standard. The standard has been developed and approved and is available in Norwegian and in English.

We also participate to the work with NIPWG for the development of an international port standard and we will update our standard accordingly.

We have digital data from 17 ports in Norway in the database. A registration document has been prepared in Norwegian, so that all ports can register data themselves. An English version is under preparation. We hope this will quickly make it easier for the ports to enter data themselves and that during 2021 we will have many more ports with digital data.

Drawing rules have been made and new symbols are being prepared.

Efforts are being made to get more ports to register the data themselves. The data will be displayed in the Norwegian pilot guide, but can also be downloaded as a dataset in our national geoportal, geonorge.

By compiling the data into a common map database based on port information, we will have all the information in one place, which means that all information is correct and continuously updated.

All data will be available for download via APIs. It is a goal of NHO that all data can be used on different devices in the future.

![](_page_12_Figure_0.jpeg)

Figure 6: Data model for maritime information

This will make sure that we always have the correct data, everyone knows where the data exists and it will be easier to keep the data up to date and to share on different devices.

We did a test on data from FKB (the Norwegian common map database) without port information, versus a common map database including port information, they looked like this:

![](_page_12_Picture_4.jpeg)

Figure 7. Illustration without port information from common map database. Like it is today.

![](_page_13_Picture_0.jpeg)

Figure 8. Data from Stavanger port

![](_page_13_Picture_2.jpeg)

Figure 9. When we got the data into the common map database.

# 5. MSI

The Norwegian Maritime Directorate is the responsible body for MSI in Norway.

# 6. C-55

The last update of C-55 was sent to IHB in January 2020

# 7. Capacity building

Norway participated in and chaired the annual meeting of the IHO Capacity Building Sub-Committee in May 2020. The IRCC and the CBSC encourage Member States from the most developed regions to be involved in capacity building by assisting CBSC activities or by other means.

# 8. Oceanographic activities

The tide gauge network in Norway consist of 24 gauges including one in Ny-Ålesund at Spitsbergen. We do short-term water level measurements at locations between the permanent gauges. These are used to construct the tidal zones used to provide water level data and information for most places along the Norwegian coast. Professional users can download data from an API directly. Our website Se havnivå provides tide tables, observed water level and water level forecast for 5 days (from a model run by the Norwegian Meteorological Institute). We also present figures showing different tide levels, land levelling datum and return periods (up to 1000 years). The information in the figures are very important in coastal planning. The official Norwegian tide tables are now only available as a Pdf-file that can be downloaded from the website.

A new project called VannTett is initiated. The aim of the project is to use new technology to expand the Norwegian permanent tide gauge network, and to upgrade the short- term network. This is essential to meet the new needs for accurate and available water level data along the entire coast, in a changing climate, with continuously increasing focus on coastal preparedness. The financing of the expansion is planned to be partly by co-financing with the stakeholders like municipalities, ports, insurance companies etc. The intention is to expand the network with at least 10 new permanent stations over the next 5 years.

The first official gridded national separation models, making it possible to convert directly between different vertical datums for given positions, are now publicly available. These first models describe the relation between the geoid, Mean sea level, Chart datum and the ellipsoid (EUREF89). The models facilitate Ellipsoidally Referenced Surveying (ERS), GNSS- based dredging in the coastal zone and seamless terrain models from the deepest fjords to the highest mountains. These first versions are based on existing data and will be continuously updated in the coming years as more data is collected. At this point, the models are valid from the coast to the territorial border, but it is planned to merge the models with altimetry-derived models for the open ocean.

We have delegates in the IHO-working groups "North Sea Hydrographic Commission Tidal Working Group (NSHC-TWG)", "Tides, Water Level and Current Working Group (TWCWG)" and an observer in "Baltic Sea Hydrographic Commision - Chart Datum Working Group" (BSHC CDWG). In addition we participate in the GLOSS Group of Experts and the EuroGOOS Tide gauge task team.

# 9. Spatial Data Infrastructures

#### 9.1. Marine Spatial Data Infrastructure

MSDI is an integrated component of the <u>national SDI in Norway</u>. The cooperation <u>Norway</u> <u>digital</u> counts for more than 600 organizations, where over 50% are involved in coastal and/or offshore activities. NHS is a key player in the development of relevant collaboration

arenas between data owners, service providers and end-users to improve the user-value of marine and maritime geospatial services to society.

![](_page_15_Figure_1.jpeg)

Fig.10 Norwegian SDI approach

<u>Geonorge</u> is the national website for geospatial information in Norway. One of the core services offered is the <u>Geonorge Map Catalogue Service</u> where the users can search for, discover, and access geospatial data and services offered by public authorities in Norway.

A national governmental geospatial strategy, "<u>Everything happens somewhere</u>", has the ambition to improve the value of geospatial information and its usefulness to society in Norway. The primary objectives for this strategy is to:

- Offer a national knowledge base of geospatial information that meets important societal needs and user-priorities
- Incorporate technological tools and improve interoperability to increase interaction, efficiency and innovation
- Improve and further develop cross-sectorial cooperation and collaboration arenas between both public and private sector
- Adapt policies and framework conditions to meet the challenges within geospatial infrastructure, e-governmental services and the digital society in general

A yearly revised national action plan supports this strategy with more detailed descriptions on where to improve the national SDI.

The national geospatial strategy is very much in accordance with UNs initiative on how to develop geospatial information as a component to carry out the Sustainable Development Goals. Ref. UN-GGIMs Integrated Geospatial Information Framework (IGIF).

# 9.2. Marine Spatial Planning

NHS is participating in the development of the Marine Spatial Management Tool (MSMT) for MSP in Norway. The MSMT project "Arealverktøyprosjektet" is a national cross-sectoral cooperation, developing and assembling standardized and harmonized geospatial services to underpin the MSP processes with integrated, multi-thematic geospatial information relevant to the Marine Management Plans for the Norwegian sea-areas.

![](_page_16_Picture_3.jpeg)

Fig.11. Norwegian management plans for the Barents Sea, Norwegian Sea, and the North Sea & Skagerak, representing an area of 2.3 mill. km<sup>2</sup>.

Although Norway has been working with MSP and produced <u>integrated management plans for Norwegian</u> <u>sea-areas</u> during the last 15 years, there has been a lack of proper SDI support. One of the objectives has been to ensure proper interoperability between the MSMT and the national SDI in a way that will release expected synergistic effects like re-use of data and services, improved data flows and user-processes, richer data content, etc. A new <u>version of the MSMT</u> was released in November 2020. Improvements and further development will continue during 2021.

The MSMT represent a major step forward in the process of integrating the marine component in the Norwegian SDI. So far, 11 governmental agencies have developed and are sharing their authoritative data through their geospatial services, harmonized and integrated through the Marine Spatial Management Tool.

The MSMT was successfully utilized during the revision and updating processes of the scientific basis for the management plans carried out by the <u>Management Forum of the</u> <u>Norwegian Sea Areas</u> during 2018 and 2019. (Ref. linked-in example showing <u>overall</u> industrial activities together with plans- and regulations regarding Norwegian sea-areas).

The MSMT also played an important role in the provision of geospatial content and map compositions to the revised and updated <u>integrated management plan for marine areas</u> <u>encompassing all Norwegian sea-areas</u> published by the Norwegian Government in 2020.

## **10. Innovation**

## **NAUTILUS - New Hydrographic Infrastructure**

NHS needs to renew its management, storage and processing system for bathymetric and misc. marine geo data in order to:

- more effectively serve existing and future users
- support new data formats, standards and products
- meet future requirements for automation, machine learning, quality and lead time

NHS have therefore established a project "Nautilus" (earlier named *New Hydrographic Infrastructure*) with the aim and goal to renew our Hydrographic management systems/solution.

Norwegian governmental strategies set clear expectations to the solution and support an effective dissemination of different Marine Geodata and, at the same time, answer well to user needs and grow their values.

Expected changes to the data classification act, for bathymetric data and bottom objects, is understood to allow and define production and dissemination of new high-resolution geodata for the public, which also set requirements to the need for a greater degree of automation. NHS's nautical product users expect navigation-critical data to be released faster and more efficiently. International commitments along with the need to support new nautical standards will also come in effect in the coming years.

Requirements and processes for current management and production system for bathymetric data are largely based on and defined by nautical production and products. This will change to a more data and product generic solution, not relieving the importance of nautical products.

The new system is expected to be an integrated and complete management solution supporting effective preparation and dissemination of a broad range of marine geodata, including also bathymetric and derived bathymetric products. The solution must still ensure an effective production of authorized nautical products.

![](_page_17_Figure_11.jpeg)

Fig.12. Concept of Nautilus

The new solution will be based on a modern technological platform that supports:

- an efficient and integrated nautical production
- different digitization and data sharing solutions
- fast data access and effective bathymetric production (short processing time / increased automation)

- layered services and functional structure (allowing algorithmic, AI/ML, production etc. processes to run on top off the data)
- an integrated metadata management
- management of complete and original data (no or minimum generalization required)
- integrated product and data sharing solutions (machine-to-machine, APIs, etc.).

NHS has identified the following processes that will be supported in the new solution, whereas processes within the yellow frame are given priority within NHI program:

![](_page_18_Figure_5.jpeg)

The NHI project is planned to take up to 5 years to complete, and will include organizational as well as technological changes.

First system deliverables are planned for 2021.

#### 11. Other activities

#### **International activities**

The NHS is involved in several Working Groups, Committees and Commissions related to IHO. Norway chairs the IHO CBSC and the IOC IHO GEBCO Guiding Committee and has representatives in the following Sub-Committees and Working Groups: IHO Council, S-100, DQ, ENC, NC, NIP, TWC, IEN, MSDI, CSB and WEND. We have participated in the HSSC and the IRCC meetings in 2019 and 2020. Norway is actively participating in 5 Hydrographic Commissions: ARHC, HCA, NHC, NSHC and SAIHC.

The NHS is a member of the UN-GGIM Working Group on Marine Geospatial Information, sits on the GEBCO Guidance Committee and actively contributes to the Seabed 2030 project.

As operator of Primar we participate in all related meetings.

NHS is an active partner in EMODNet.