

January 2014



A MULTINATIONAL COOPERATION

PRIMAR is a multi-lateral and government based organization. As a regional ENC coordinating centre (RENC), it's primary role is to ensure a harmonized quality level of official electronic navigational charts (ENCs) from many producer nations (i.e. national hydrographic offices) and making this information available through a network of distributors to international shipping on a 24/7 basis.



OPERATION OF PRIMAR

PRIMAR is operated by the Norwegian Hydrographic Service (NHS) on a non-profit cost recovery basis. The NHS uses a Norwegian state owned company, Electronic Chart Centre AS (ECC), to deliver services within database operations/validation, sales and distribution, infrastructure and R&D to PRIMAR through a service provider agreement. NHS is responsible for the daily operation within the framework of strategies and policies decided by the PRIMAR Advisory Committee.

The daily operation of PRIMAR includes:

- Administration and signing of agreements (bilateral agreements between HOs and NHS for RENC cooperation, licensing agreements, distributor agreements, navy supplier agreements and national agreements).
- Receive and quality assures (QA) ENC's.
- Support and follow up HO's in all issues related to QA.
- Coordinate feedback from the market to the relevant member nation.
- Make available online ENC's via a global network of authorized distributors (DVD, CD, web, and ftp).
- Revenue Management: PRIMAR manages all aspects of sales reporting, invoicing and revenue collection process on behalf of its member nations.
- Support and follow up distributors.
- Maintain and develop infrastructure in order to meet customer requirements (HO's and distributors).
- Organize and chair PRIMAR Financial Working Group, PRIMAR Marketing Working Group and Technical Experts Meetings.
- Provide operational and technical support and experience to relevant international working groups.

The Cooperating Hydrographic Offices, through the PRIMAR Advisory Committee (PAC) decides on the overarching policy of PRIMAR, and has outlined the following vision, mission and objectives:

PRIMAR's Vision:

In order to enhance safety at sea and protect the maritime environment, PRIMAR's vision is to be the most efficient model for the provision of ENC services and maritime geospatial data worldwide.

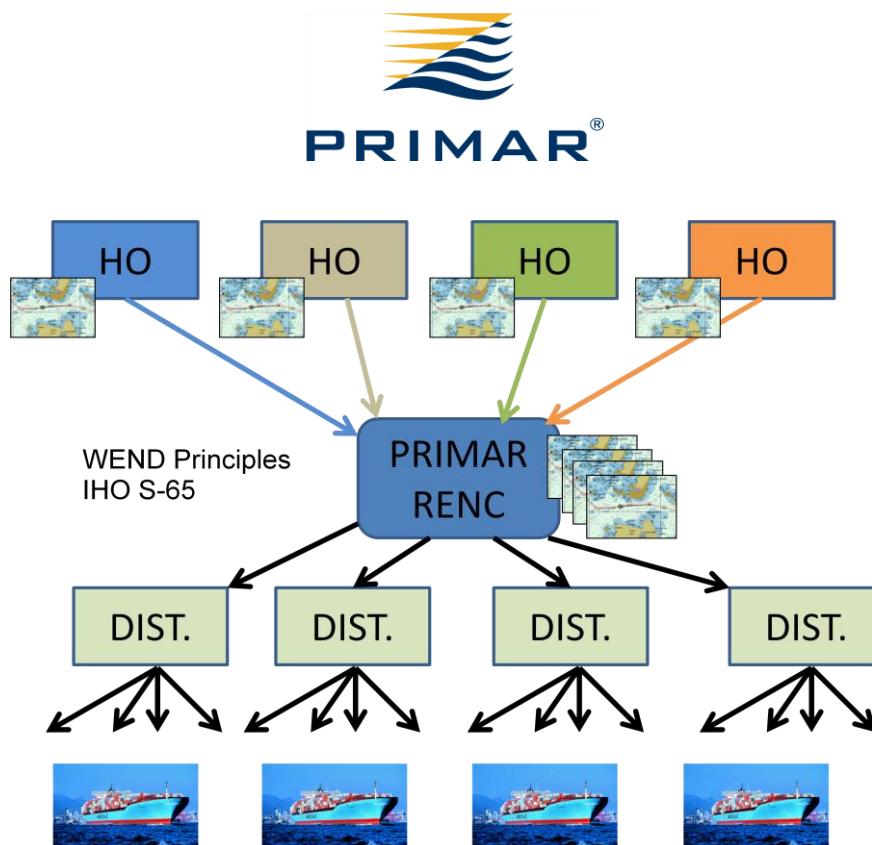


Figure 1 PRIMAR RENC Concept

PRIMAR'S MISSION

PRIMAR, as a non-profit organization, is to:

- Assume RENC responsibilities in support of UN Resolutions, IMO Conventions and IHO WEND Principles.
- Provide all actors with responsibilities for safety of navigation and protection of the maritime environment with accurate up to date maritime geospatial data.
- Provide to HOs service solutions and framework to co-operate in the management and provision of ENC and maritime geospatial data.
- Consider Capacity Building support to achieve adequate global ENC coverage.

PRIMAR'S OBJECTIVES

- Foster closer cooperation between HOs to reach the greatest level of harmonization and consistency in ENC services.
- Encourage and support the achievement of adequate global ENC coverage.
- Encourage and support efforts to establish RENCs.
- To provide the most efficient ENC quality and distribution services and ensure continuous improvement.
- Foster close cooperation with private industry and distribution network to ensure the most efficient services.
- To ensure the visibility of PRIMAR and the promotion of IHO global ENC coverage.



- Provide cooperating hydrographic offices with operational and technical support and services in their work to produce, quality control and deliver harmonised ENC services compliant with all relevant international standards.

PRIMAR MEMBER NATIONS AND GOVERNANCE

The following nations are members of PRIMAR: Brazil, Croatia, Estonia, Finland, France, Georgia, Greece, Iran, Latvia, Lithuania, Montenegro, Mozambique, Norway, Poland, Russia and Sweden.

The formal framework of the RENC cooperation is the PRIMAR Advisory Committee (PAC) as defined in the PAC statutes. PRIMAR is controlled by its members through PAC. PAC provides guidance and advice on the RENC operation and exchange opinions on related topics of mutual interest. Decisions are reached by consensus. All PAC members are invited to an annual meeting. Decisions can be made on strategy issues, technical issues (tools for ENC quality control, non-navigation services, etc.), marketing issues (pricing and distribution models, etc.), information, communication and financial issues (cost and revenue sharing, etc.). PAC is chaired by a representative from a member nation and this position is rotated amongst the members.

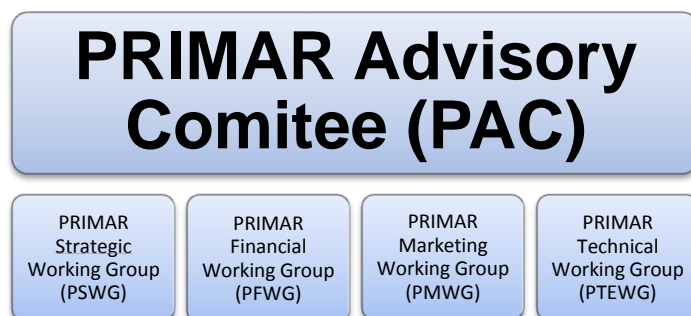


Figure 2 PRIMAR Governance

PRIMAR MEMBERSHIP AND FINANCIAL MODEL

PRIMAR RENC MEMBERS

PRIMAR RENC membership is attained by signing a bilateral agreement between the member nation's Hydrographic Office and the operator of the PRIMAR RENC, the Norwegian Hydrographic Service (NHS). There is no fee for signing on the agreement. The member nation's ENCs are then made available in the PRIMAR database and sold to end-users through PRIMAR's worldwide network of authorized distributors. RENC member nations receive a 50 % royalty on their ENC sales through PRIMAR. Royalty payback to member nations is made twice a year, in July and January. The member nations decide the wholesale price of their ENC themselves, while the PRIMAR distributors set the



retail price towards the end-users. The 50 % kept by PRIMAR covers RENC operating costs, gives the member nations access to a wide range of PRIMAR ENC tools as well as the option of signing on to the use of PRIMAR national services for Navy, pilots, VTS etc. Being a full RENC member also gives access to all PRIMAR working groups and committees.

The budget and the royalty percentage are subject to discussion and decision by the annual PRIMAR Advisory Committee meeting. The financial model valid from 2014 and beyond operates with a 50 % royalty payback to PRIMAR member nations until cost recovery for the RENC operation is attained. The member nations will receive 100 % return on sales above that level.

PRIMAR RENC members have exclusive access to the services described under “Benefits for PRIMAR members”.

PRIMAR RENC LICENSING PARTNERS

For nations that prefer to remain outside the RENC cooperation, but still provide their ENCs for distribution through PRIMARs ENC service, a licensee agreement with the Norwegian Hydrographic Service is an option. This license agreement allows for the nation’s ENCs to be made available in the PRIMAR database and ENC service, and sold to end-users through PRIMAR’s worldwide network of authorized distributors. Either a standard NHS or the nation’s own licensing agreement can be used for this purpose. There is no fee for entering a licensing agreement with NHS.

The nation decides the price of their ENC towards PRIMAR, PRIMAR set the wholesale price towards the distributors, and the distributors set the retail price towards the end-users. Reporting of sales and payback from PRIMAR to the nation’s Hydrographic Office can be done monthly, quarterly or at half year intervals.

The coverage in the PRIMAR ENC service is further extended through the VAR agreement between NHS and IC-ENC. This agreement enables all the ENCs from the IC-ENC RENC member nations to be made available in the PRIMAR ENC service.

THE PRIMAR MARKET

The primary market segment for PRIMAR is the regulatory (SOLAS) shipping for which the carriage of up- to-date official charts is an obligation. ENCs fulfill this carriage requirements provided they are used on an ECDIS type approved in accordance with IMO standards. This market segment constitutes the main pillar in the PRIMAR service and is served via a global network of distributors, which are the actually customers of PRIMAR. PRIMAR distributors serve the end user market and provide continuous online sales reports on ENC usage.

There is a wider uptake and use of chart information in many new areas and application domains, and PRIMAR is working with their distributors to support them with services required by emerging



new markets. PRIMAR is in progress to support their cooperating hydrographic offices with new services based on the new IHO S-101 and S-102 standards, and to meet emerging requirements for IMO e-navigation services. This includes services for quality assurance for the new products, management and distribution of a dual product line with S-57 and S-101, as well as transfer of experience and knowledge from our work supporting the emerging new IHO standards. PRIMAR will provide services to support S-101 in e-navigation.

PRIMAR SERVICE LEVELS

Whilst the SOLAS shipping market is an obligatory state service which all CHOs must cover, other areas like e.g. Navy, Pilotage Service, VTS or Coastal Zone Management are provided based on national priorities and requirements. Consequently PRIMAR must ensure that the right level of price, quality and responsiveness is established for the different service areas, not to jeopardize the high priority areas to the advantage of the areas having less stringent requirements.

As an overall guidance to the development of PRIMAR, the PRIMAR Advisory Committee has defined 5 Levels which, in order of priority, describes the Services that is needed to support the vision, mission and objectives. The service levels are defined as follows:

Level 1 – make validated ENC's available to the commercial shipping community (the present basic service) and assume on behalf CHOs the RENC's functions (cross-border validation, quality control, distribution)

Level 2 – use PRIMAR infrastructure to provide ENC's to other governmental, navigation and safety related services (pilot, VTS, Navy e-navigation related)

Level 3 – utilize PRIMAR infrastructure to support other governmental geodata-based but non-navigation services with ENC's

Level 4 – utilize PRIMAR infrastructure to support other governmental geodata-based but non-navigation services with geodata derived from the ENC's (Web Map Services, Maritime Spatial Data Infrastructures)

Level 5 – use PRIMAR for general purposes – i.e. deliver data and services to public and/or commercial players on behalf of a CHO based on a request from the latter

The service levels strengthen the national maritime infrastructure and make member states of PRIMAR better able to meet various national and international obligations since they can directly apply the PRIMAR services. The PRIMAR service levels can be illustrated through a maritime safety wheel, which shows how different actors in need of the same chart data all can be served by PRIMAR.

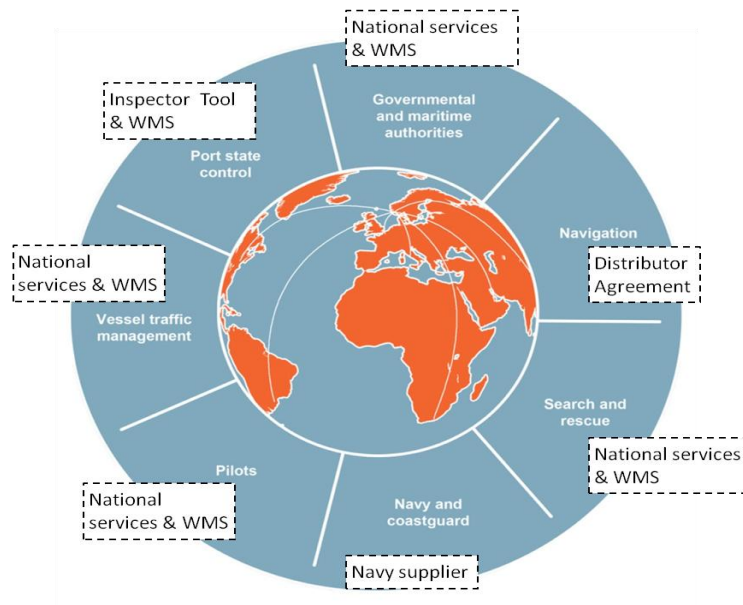


Figure 3 PRIMAR Service Level & Maritime Safety Circle

THE PRIMAR ENC VALUE CHAIN

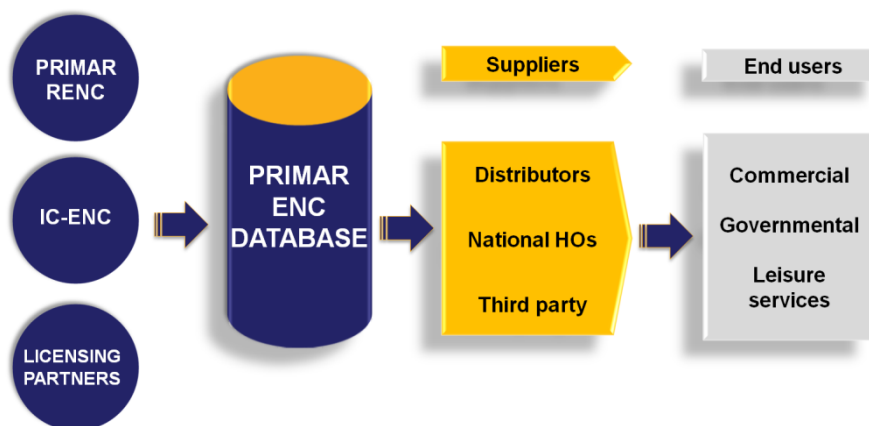


Figure 4 PRIMAR Value Chain

The above figure illustrates the PRIMAR ENC value chain. ENC's from a wide range of national hydrographic offices are brought together into a single seamless database. The PRIMAR database consists of ENC's from PRIMAR RENC member nations, from the IC-ENC RENC and from nations having licence agreement with NHS. The PRIMAR ENC database is continuously updated; new data are continuously and promptly released for the benefit of online users, with CDs always provided for backup. As of January 2014, the PRIMAR ENC database consist of more than 11 700 ENC's from 46 different nations.

PRIMAR's core aim is to make ENC's available to everyone. To ensure this we have a worldwide network of distributors. Our ENC distributors are carefully selected on the basis of their experience



and expertise in dealing with the maritime community and in supplying navigational products and services. As a result they are all able to offer value-added products and services which complement our ENC service.

For RENC member nations, PRIMAR infrastructure can be used to provide national services for navies and governmental organizations. Distribution of ENC can be conducted by national HO's or governmental third party entities.

PRIMAR MECHANISM OF ENC DISTRIBUTION

The PRIMAR ENC Service is only available through the international network of authorized distributors. Ensuring that ENCs can be accessed through simple and reliable supply arrangements is often cited as crucial for increasing the take-up of ENCs amongst seafarers. We provide our network of commercial distributors a variety of methods for ordering and distributing ENC data to end users, so that they can choose the most appropriate option for their own business and their particular customers.

Successful technology simplifies logistics, ease of use and accessibility. Our services have a high level of quality and dependability combined with user-friendliness. This simplifies processes such as customer management, ENC purchasing and ENC distribution. The following services are available to PRIMAR's network of commercial distributors:

- **PRIMAR Chart Catalogue.** The PRIMAR Chart Catalogue is an ordering and vessel chart management tool. It allows for the viewing of ENC coverage available in our service. The catalogue is used by distributors to manage sales and distribution of ENC services to the commercial market and is available 24-7 for appointed distributors. Its main functions are visualization of ENC coverage, customer and vessel management, ENC order processing and permit delivery.

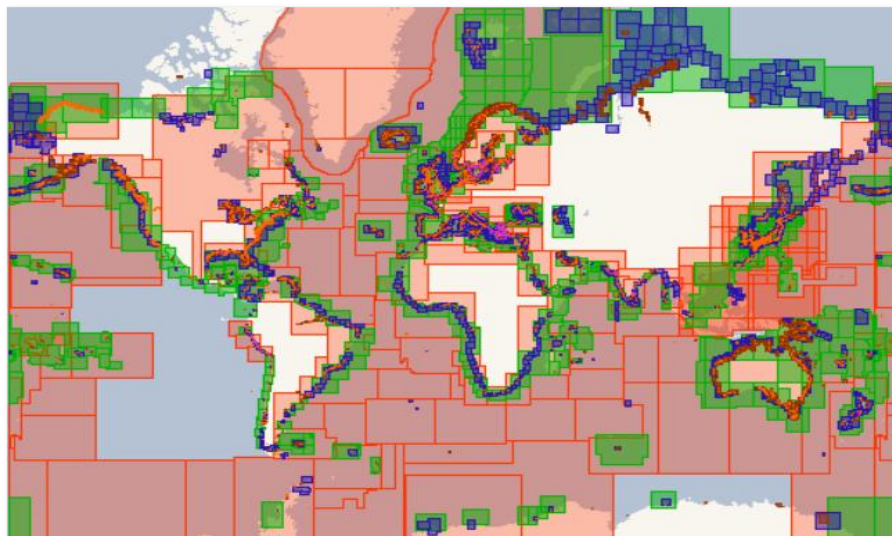


Figure 5 PRIMAR Chart Catalogue



- **PRIMAR Business-to-Business (B2B) Service.** PRIMAR B2B Service integrates a distributor's business systems with PRIMAR ENC Service. The secure interface is designed to support online customer & vessel registration and management which facilitate online quotations, ENC ordering and the delivery of cell permits. Customer sale transactions and ordering processes can therefore be easily integrated into a single service system of the distributor. This supports the distributor's freedom to choose the optimum solution for his business environment.
- **PRIMAR ENC CD Service.** PRIMAR delivers a weekly ENC Base and Update CD service. The content of these CDs are encrypted in accordance with IHO S-63 and can only be viewed by compatible systems and with a valid permit file/license.
- **PRIMAR ENC DVD Service.** PRIMAR delivers a weekly complete exchange set via ftp and the web. This exchange set contains the whole PRIMAR database. The content of this exchange set are encrypted in accordance with IHO S-63.
- **PRIMAR Online Service.** PRIMAR online service can be used in addition to or as a supplement to the PRIMAR ENC CD and Permit Service. PRIMAR Online is an internet-based service for maintaining a vessel's ENC portfolio and is provided by the distributor. Our available online services are as follows:
 - PRIMAR online using the Chart Catalogue - PRIMAR online is an integrated part of the PRIMAR Chart Catalogue for downloading of ENCs and permits.
 - PRIMAR online using e-mail - PRIMAR online e-mail notification is an independent web service for downloading of ENCs and permits. The customer will regularly receive an e-mail including a link to a web page where licensed ENCs and permits are available for download.
 - PRIMAR online using ECDIS - ECDIS online is an internet-based service for maintaining a vessel's ENC portfolio. In this service the customer has functionality in its ECDIS/ECS to directly interface and download ENCs and permits from PRIMAR.
- **PRIMAR FTP and Web Service.** The distributor has secure access to download the weekly PRIMAR CD and DVD content (Image) on an FTP server through the PRIMAR FTP Service. The distributor will be informed via e-mail when the weekly CD and DVD content (image) is published.
- **Pay As You Sail (PAYS).** PRIMAR offers a service that will allow PRIMAR ENC data to be passively installed on a navigation system. The data can be freely viewed and accessed for planning purposes. The distributor must establish a mechanism which accurately registers all use of ENCs accessed during navigation ENC usage information is transmitted automatically to PRIMAR. The service ensures that the user has immediate access to additional ENC



coverage in case of re-routing due to operational or contingency purposes.

- **Web Chart Service.** PRIMAR web chart service uses the internet to deliver chart images derived from the content of updated ENC's made available by ENC providers. This service generates an actual image of the geographic information, and sends it as images directly to the end user's mapping application. Any application or web browser supporting the web map service (WMS) standard can easily access and use the service. The web chart service is not for navigation, but for viewing ENC's on web and in GIS applications without an ECDIS or ECS.

PRIMAR GOVERNMENTAL SERVICES

The complete range of PRIMAR infrastructure services are also made available to cooperating hydrographic offices (CHO) or their government organizations to support national requirement for ENC distribution services. This avoids duplication of efforts and investments since the PRIMAR government services are available online to the CHO. The governmental segment can be divided into two distinctive user-areas:

- Government services related to maritime safety and environment protection, using ENC's for navigational purposes, for SOLAS and non-SOLAS fleets.
 - Secure services to Navy/Coast Guard
 - Pilotage services
 - Vessel Traffic Control
 - Port State Control
 - Search and Rescue
 - Fishery and resource monitoring and control
- Non-navigational services using ENC's or products derived from ENC's.
 - General exchanges of maritime geographic information within the government administration and between states, as anticipated in e.g. EU INSPIRE.
 - Coastal Zone Management
 - Contingency planning
- **Navy Supplier Service.** PRIMAR nations are offered a Navy Supplier service, for delivery of ENC's to the nation's own navy / coast guard. It is a national discretion to appoint a supplier for ENC delivery to its own navy.

Benefits: Option of unencrypted distribution of ENC's to navy. The nation can determine the price of own ENC's to the navy. Other ENC's in the PRIMAR database are available at wholesale price.

- **National services for Pilots, VTS, Search & Rescue** Our governmental services make a strong contribution to safe navigation and to increased maritime safety for marine operations and traffic management in near-shore waters. The purpose of the service is to provide a solution

for an efficient exchange of ENC's at a governmental level. Our services allow everyone in the network to access the same quality ENC's. All distribution must be authorized by its national HO.

Benefits: Services for national maritime use, compliance with international regulations, flexible solutions, on-going support services, official updated charts, safe and efficient management of operations.

- **PRIMAR Web Map Service (WMS).** PRIMAR Web Map Service uses internet to deliver chart images derived from the content of updated electronic navigational charts (ENC) made available by PRIMAR nations. This service generates up-to-date images of ENC data and sends it as images directly to the end user's mapping application. No vector data is distributed, only images of the ENC data. The Web Chart Service is not for navigation but for viewing ENC's on the web. By utilizing the WMS service, PRIMAR nations can make available ENC and related data to a much wider spectrum of end-users. PRIMAR nations can also integrate the service with other tools used in their operations, so that operations can be performed seamless and with the best chart background.

Benefits: Flexible viewing, chart content query function, predefined and self-defined presentation styles, 24/7 availability, developed in-house, high degree of technical knowledge.

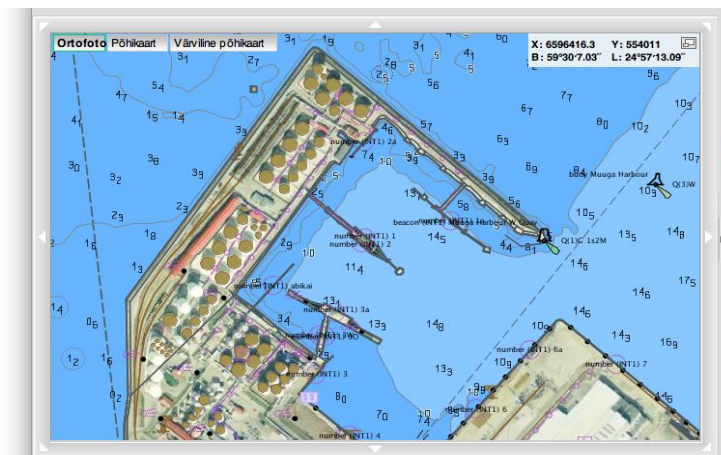


Figure 6 PRIMAR WMS Service

- **PRIMAR Inspector Service.** PRIMAR nations are offered access to Inspector - a tool for port state control of ENC status on vessels. Maritime Authorities responsible for enforcing **port state control** can by using this service to access real-time chart information, ENC coverage and update status for all vessels using PRIMAR ENC services. The Inspector tool enables the PSCO to access the information about the ENC portfolio of a vessel. This information will increase the efficiency of the inspections carried out on any vessel sailing with ECDIS and ENC's.

Benefits: Efficient verification that the official electronic charts are used, cost efficiency due to advance preparation, focus on official charts and safety at sea, free of charge and available around the clock



- **Distribution and Revenue Management**

PRIMAR coordinates and manages the wholesale supply of its members' ENC's. PRIMAR provides both commercial and governmental distributors a variety of methods for ordering and distributing ENC data to their end users, so that they can choose the most appropriate option for their business and customers. Successful technology simplifies logistics, ease of use and accessibility. This simplifies processes such as customer management, ENC purchasing, ENC distribution and revenue management. PRIMAR nations have access to online reports on ENC use, revenue, customer information (e.g. vessel name, IMO number of vessels, distributor name, date of purchase, which ENC does the vessel have permits for etc).

All PRIMAR members have on-line access to national sales, data and customer figures through the VPN.

It is the discretion of the PRIMAR member nation to decide the policy and mechanism for delivery of ENC's for national services.

PRIMAR TECHNOLOGY

PRIMAR's high level of technological innovation is directly leading to cost- and operational efficiency, both within the PRIMAR member countries and within the PRIMAR distributor network. The technological solutions allows for flexibility and control of data within the member states own organization. As a member of PRIMAR, access is granted to infrastructure and services which not only distributes own data through a global network of distributors, but which also can be utilized to generate revenue directly back to the individual country.

BENEFITS FOR PRIMAR MEMBERS

PRIMAR has developed customized tools for its members, for a cost-effective performance in delivery, quality control and distribution of data to the global shipping market.

The benefits for PRIMAR members can be summed up as follows:

- ✓ Innovative and flexible tools for ENC distribution.
- ✓ Well developed and good services for ENC quality control.
- ✓ HO with full control and management over own ENC's.
- ✓ Around the clock access to the ENC database.
- ✓ Access to a vast community of shared interest in ENC production.
- ✓ Access to support services to all the tools and services provided by PRIMAR.
- ✓ Support for all relevant IHO data standards – S-57, S-58, S-65, S-101, S-102.
- ✓ Annual upgrades and ongoing technical development.
- ✓ Tools / services that make it possible to operate national services with the possibility of direct revenue.



- ✓ Online reports on ENC use, revenue and customer information.

PRIMAR is committed to operating a diverse marketplace, offering our member countries more choice and freedom to optimize their own national services using the infrastructure developed by PRIMAR. The following table provides an overview of the tools and services available to PRIMAR members:

Database management tools and services	Quality Assurance Tools and Services	National Services
<ul style="list-style-type: none"> ✓ ENC upload/upload checks ✓ ENC download Pre-Released ✓ ENC delete ✓ ENC release ✓ ENC download release ✓ ENC reports ✓ ENC usage/sales reports ✓ ENC exchange set generator ✓ IHO meta data report ✓ Data protection and digital signature ✓ S-102 data distribution 	<ul style="list-style-type: none"> ✓ ENC validation report checker (VRC) based on: <ul style="list-style-type: none"> ○ dKart Inspector ○ ENC Analyzer ✓ S-57 Advisor ✓ ENC Overlap checker ✓ ISO8211 to Text ✓ ENC check update ✓ ECDIS Furuno and Transas + (Maris & Adveto) ✓ S-57 support ✓ S-101/S-102 competence/general competence on IHO standards 	<ul style="list-style-type: none"> ✓ ENC Pilot Services ✓ ENC VTS Services ✓ ENC Navy Services ✓ Inspector service (Port State Control) ✓ Web Map Services based on ENC

S-63 ENCRYPTION

PRIMAR manages data protection (digital signatures and encryption) in accordance with the IHO standards S-63 e1.0 and e1.1 on behalf of its member states. Work is in progress to offer functionality to its member states where they can digitally sign their own ENC data and PRIMAR will maintain the signature in their distribution services. Such a service maintains a national HO interest in authenticating the source and traceability of national ENC data delivered through PRIMAR is in accordance with international safety guidelines and IHO S-63 standards.

PRIMAR DATABASE MANAGEMENT

Our online-based tool, Virtual PRIMAR Network (VPN), allows a member nation to access its own data at any time. VPN is a web tool which makes it possible to perform an encrypted transfer of ENCs from a member nation directly to our pre-release database. PRIMAR provides an extensive range of ENC quality and data management services to its CHOs. Extensive online reports are available to guide the hydrographic office on the status of their ENC data. The PRIMAR database and VPN allows for:

- Encrypted transfer of ENC data to PRIMAR ENC database



- ENC data are stored in a “pre-release” database for automatic and extensive quality control with online validation reports and graphical view of issues requiring further control by HO
- HO responsible for releasing national ENC data and updates
- Service options are available for data transfer between member states for quality control

PRIMAR QUALITY ASSURANCE SERVICES AND TOOLS

All ENCs delivered to PRIMAR undergo a series of validation checks and quality control. The main tool used for ENC quality control available for PRIMAR member nations is the **validation report checker (VRC)**. The VRC gives access to a whole range of different tools for checking the quality and consistency of the ENC product which are not available in other commercial ENC quality assurance tools.

If any errors are detected from the approved validation tools used, the ENCs will be rejected. All messages reported are categorised with guidance on how to proceed with the validation of the ENCs. Historical data from the validation process of each ENC is stored and easily accessible in the VRC. PRIMAR provides the services below to support the HO in interpreting, understanding and suggest appropriate measures to resolve quality issues.

- **ENC consistency.** The ENC consistency tool within the VRC compares uploaded ENCs and checks for vertical and horizontal inconsistencies, ref IHO S-65 and IHO S-57 Use of the Object Catalogue. ENCs can be compared vertically, so that the content of two ENC cells can be viewed simultaneously. At the same time, the ENC display will provide access to object/attribute information for the ENC cells being checked. When choosing to check for horizontal inconsistency, the ENC border areas of two neighboring countries can be compared.
- **ENC overlap.** According to international standards, ENCs should not overlap within the same navigational usage band. The ENC overlap checker displays a graphical overview of ENCs overlapping based on the selection criteria chosen for data within a country and between neighboring countries. This tool allows ENCs from one country in the database to be chosen, and will then display a list of overlapping ENC cells horizontally and vertically if an overlap for the chosen country exists. PRIMAR will always perform an overlap check against our database on any new ENC cells uploaded to our service. Should any overlap be discovered, a report will be produced and sent to the relevant HO.
- **S-57 Advisor.** The S-57 Advisor facilitates the search for ENC quality information and contains errors/warnings discovered when ENCs have been validated by approved validation tools. It also contains error messages from ECDIS systems which are discovered during our quality review of ENCs. The errors/warnings are listed with a description and references to international standards. All errors/warnings are classified as either "HO to check", "Failed" or "Accepted". The S-57 Advisor database is kept continuously updated.

- **ISO8211 to Text.** This tool can be used to convert both S-57 and S-101 files to a human readable format, enabling the HO's to look deeper into the structure of the data format if required.
- **ECDIS system checks.** All ENC's are checked in 2 ECDIS systems. Errors discovered here are recorded in the S57 Advisor database.
- **Check update.** This tool makes it easy to check the content of an update. All changes to the feature objects in the update are listed. The inserted, modified or deleted objects are listed with their record ID. The changed feature(s) can also be viewed in the chart view.
- **S-57, S-101 and S-102 support** from highly knowledgeable staff.

The following figure illustrates the PRIMAR ENC upload procedure and validation checks

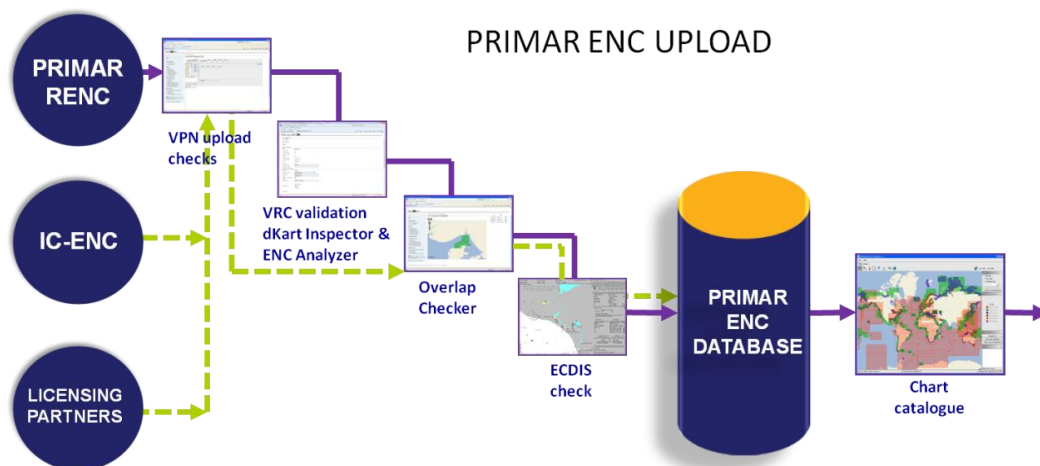


Figure 7 PRIMAR ENC Validation Procedures

HOW DO I FIND OUT MORE?

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