Document Revisions

**Information paper**

**The e-Navigation Architecture**

**As seen from Ashore**

**Edition 1**

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Revisions to the IALA Document are to be noted in the table prior to the issue of a revised document.

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| **Date** | **Page / Section Revised** | **Requirement for Revision** |
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Information Paper

**The e-Navigation Architecture as Seen from Ashore**

# Introduction

This document is written as a high-level introduction to the shore-side part of the e-Navigation architecture. First, the document introduces the main elements of the complete e-Navigation architecture and, then, it continues with a description of the shore-based system architecture. Documents draft Recommendation e-NAV-140, edition 2 and draft Recommendation e-NAV-201 provide a more extensive description of the shore-based architecture and are recommended as follow-on to the present document.

# The overarching E-Navigation architecture

One way of understanding the concept of e-Navigation is to look at it from a user’s perspective. As visualized in figure 1, the architecture can be divided into three parts; the ship side, shore side and the interaction between ship and shore. This represents the overarching architecture from a users’ perspective.

The ship side represents the users on-board a ship, whilst the shore side typically represent users from communities like Vessel Traffic Services (VTS), Allied Services and even users from communities within the logistics domain.

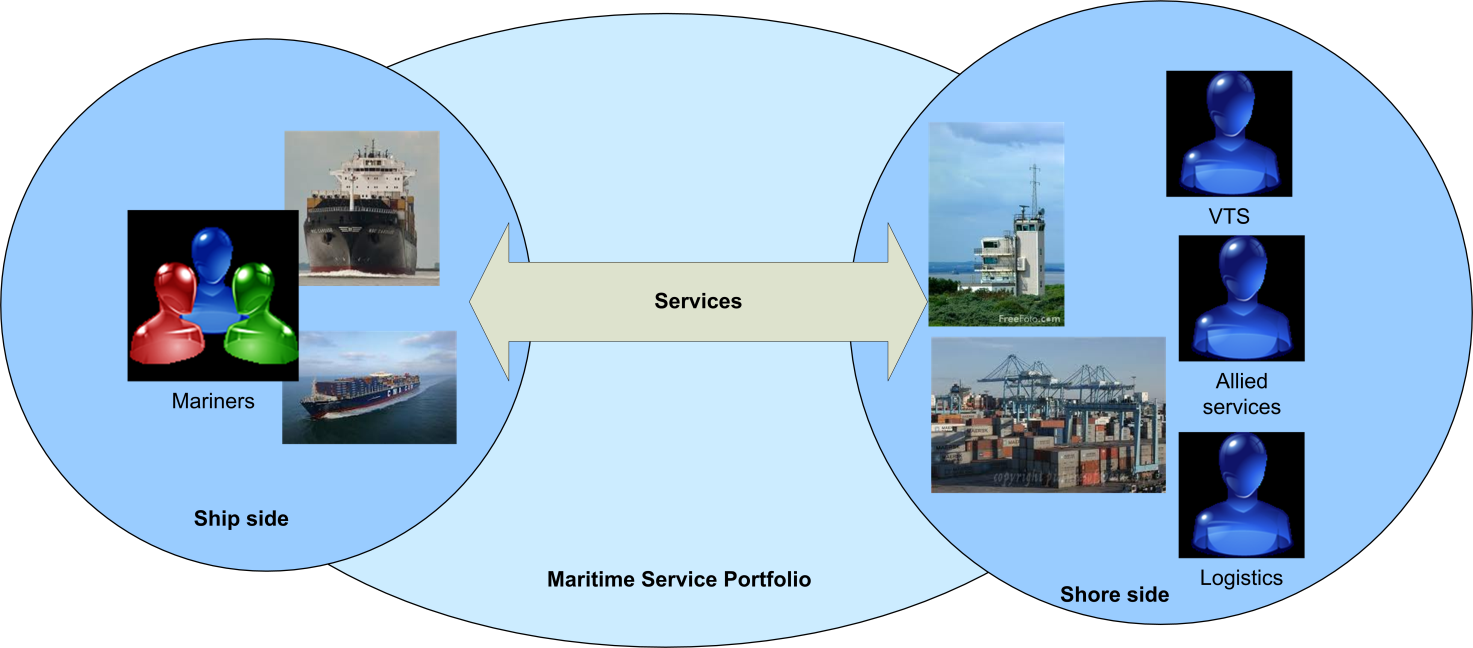


Figure 1 e-Navigation Users’ Perspective

To enable the both side to communicate and to exchange information, e-Navigation has defined the term “Services”. From a user’s perspective, the important services will be the operational services. However, there also need to be technical services to be able to provide these operational services (figure 2). Altogether, these services are referred to as the Maritime Service Portfolio (MSP).

A MSP defines and describes the whole set of operational and technical services and the level of these services, as provided by a stakeholder in a given sea area, on a waterway, or in a port, and as appropriate. The MSP concept was conceived to achieve harmonization, modernization, integration and simplification on board and ashore. It will be further developed, based upon the IMO concept of a “Common Maritime Data Structure”.

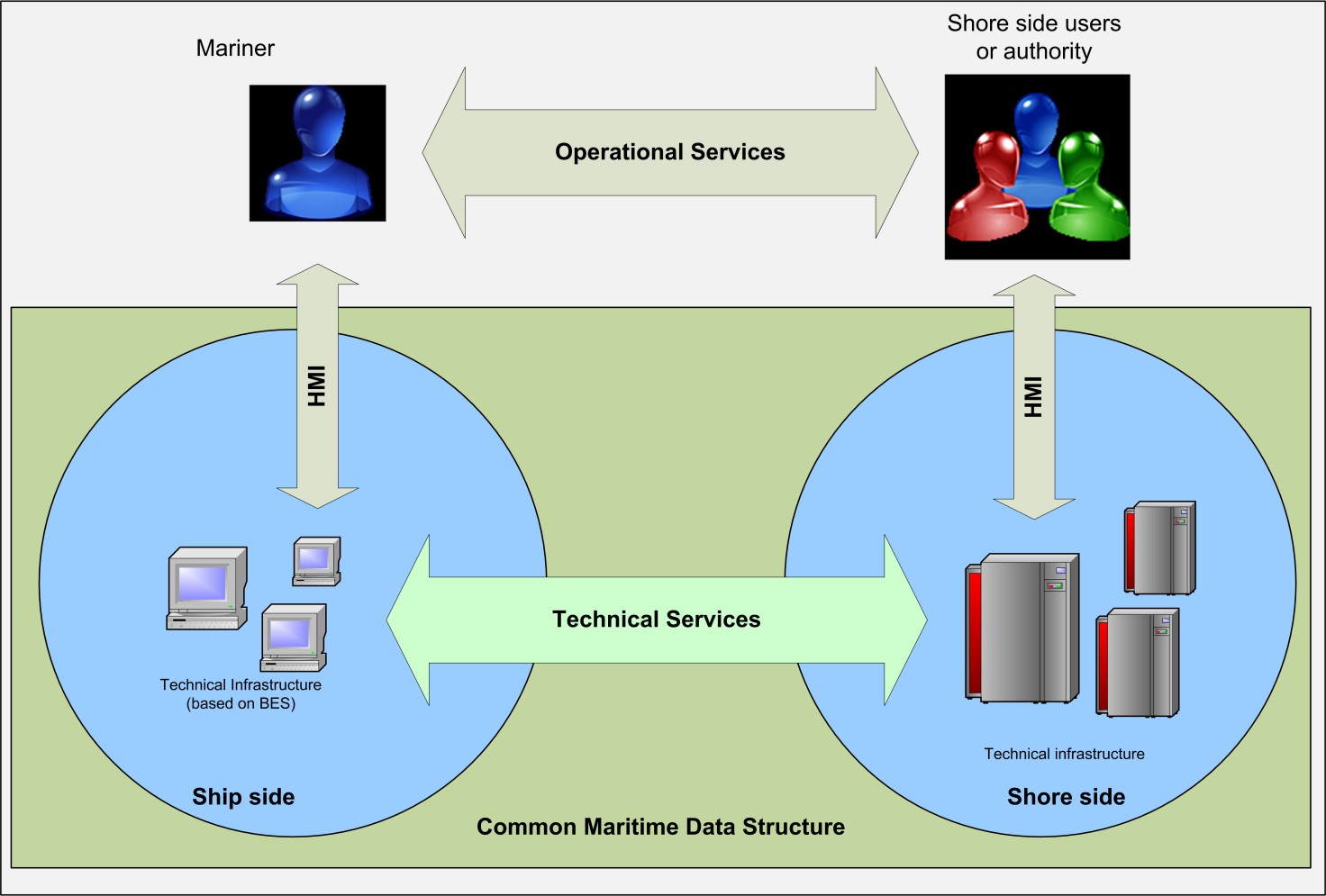


Figure 2 The e-Navigation Services Concept

To enable the concept of e-Navigation, all three sides of the architecture must be present and operating.

# The Common maritime datamodel

The Common Maritime Data Structure (CMDS, see figure 3) is the realisation of IMO’s “Common Data Structure” [Reference]. The purpose of the CMDS is to harmonise data exchange in the maritime domain by providing a common, authoritative reference. The CMDS is an abstract representation of entities within the maritime domain. It should be accessible by any stakeholder or implementer and should be *the* reference for the development of maritime services, applications and databases.

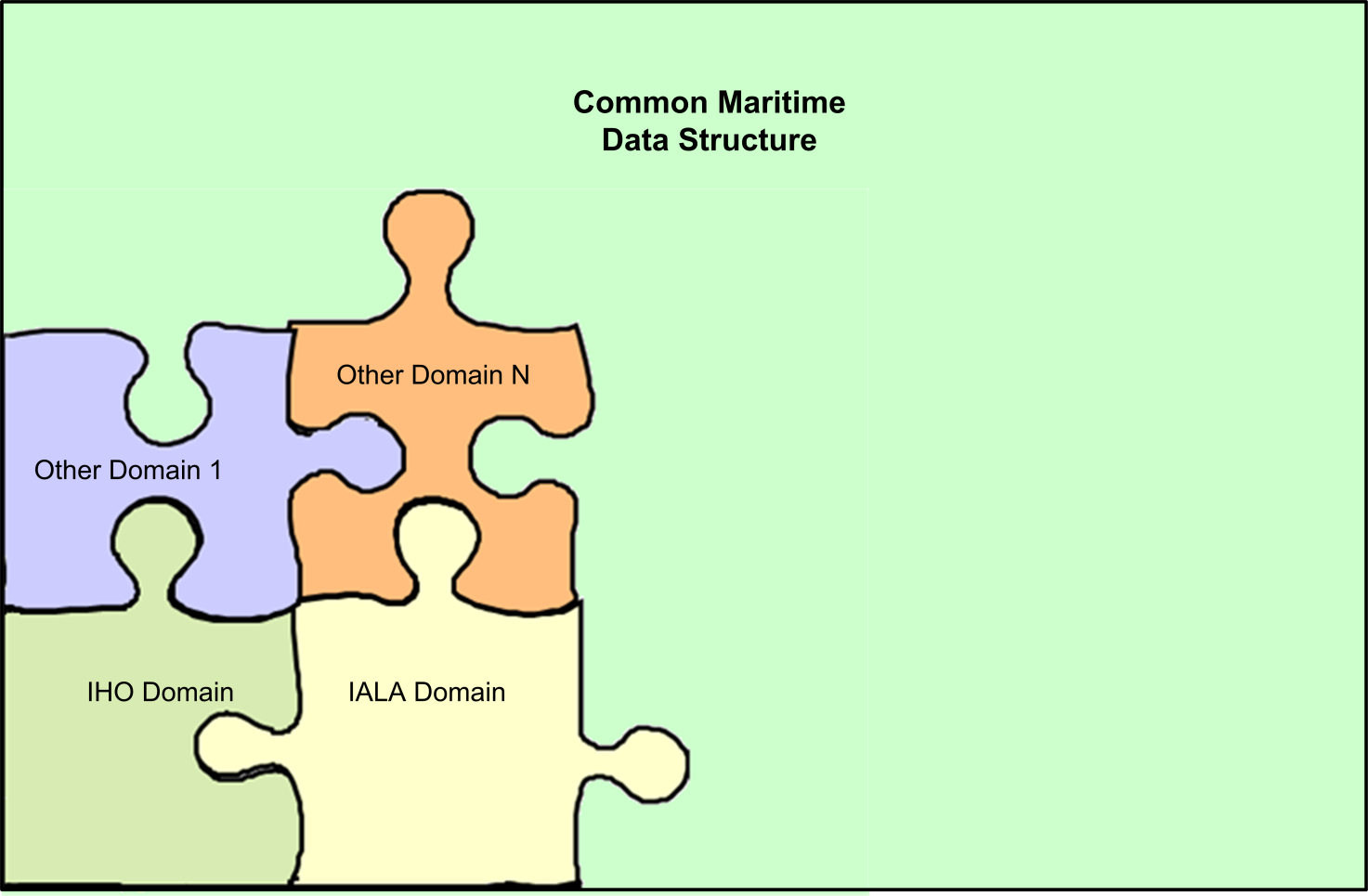


Figure 3 The Harmonized Common Maritime Data Structure

Considering the huge extent of the maritime domain, it is obvious that it should be subdivided into smaller subdomains, each of which is, preferably, governed by a recognised authority in the subdomain. A particular subdomain should only contain entities, relevant for the subdomain, and refer to other subdomains, where appropriate, in order to avoid duplication or, worse, similar entities with different meaning. This clearly requires co-ordination across the different subdomains. This fact has been recognised by IMO and will result in the establishment of the IMO/IHO Harmonisation Group on Data Modelling (HGDM).

IHO developed the S-100 GI Registry to capture, amongst others, their data modelling needs.

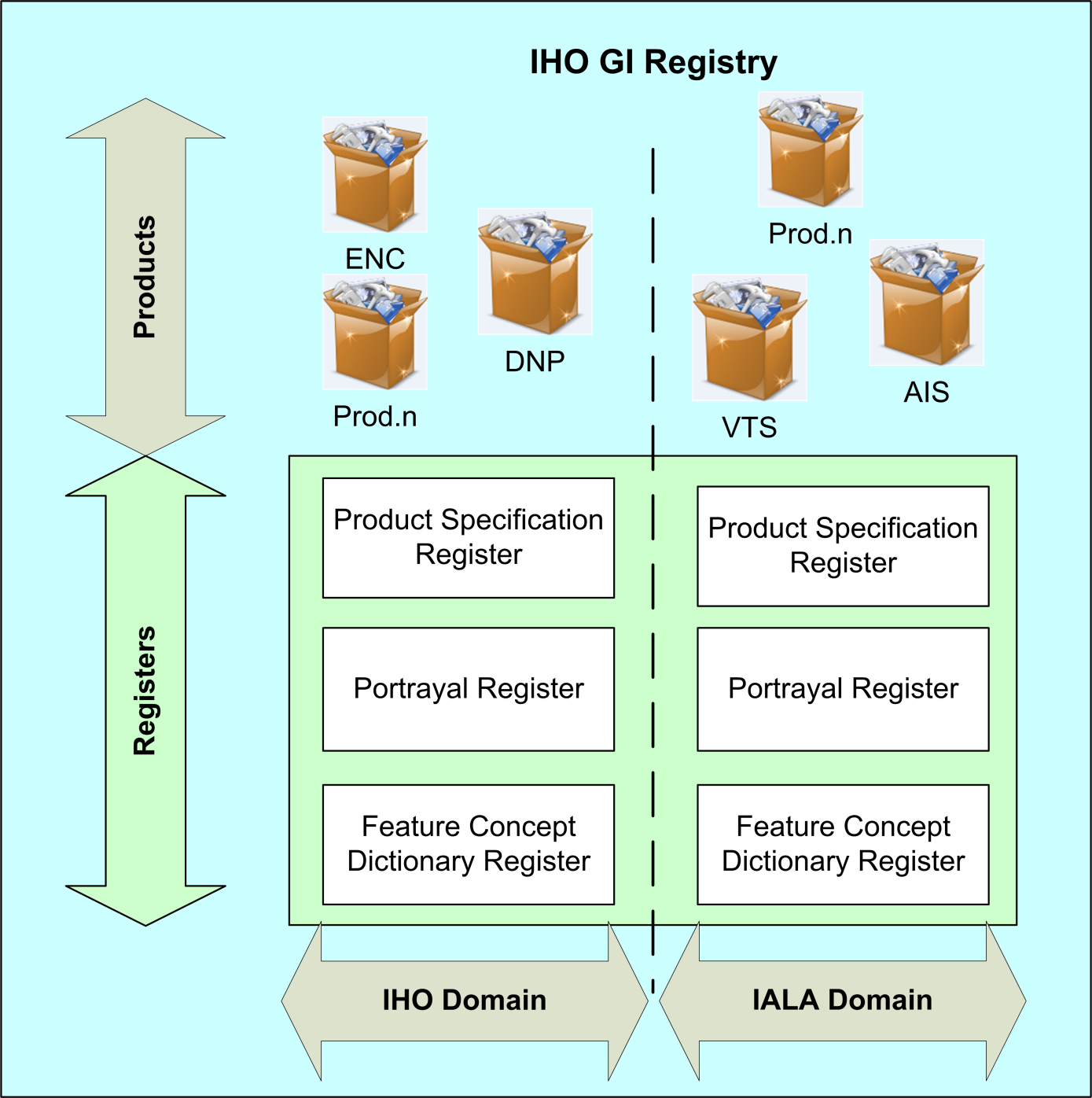


Figure 4 The IHO GI Registry

Data processing and electronic data interchange rely heavily on accurate, reliable, controllable and verifiable data recorded in databases. A prerequisite for correct and proper use and interpretation of data is that both users and owners of data have a common understanding of the meaning and representation of the data. To facilitate this common understanding, a number of characteristics, or attributes, of the data have to be defined.

These common understanding of characteristics, attributes etcetera are stored in a registry.

Rather than develop a registry specifically for e-Navigation the IHO GI Registry is going to be used for e-Navigation. In order to be able to execute the operational services, these services have to be converted to products. These products then have to be described in a product specification in order to get a common understanding about the meaning and representation of data as metioned above. IHO has done so for the products related to the IHO domain, IALA has to do so for the products for the IALA Domains.

The procedure to get entries in the IHO GI Registry and register as a Domain owner is described in S-99. IALA is currently developing a guideline describing the processes regarding Domain management and the processes to get entries in the Registry of the IALA Domain.

# THE SHORE-BASED SETUP FOR FACILITATING E-NAVIGATION

The shore-based systems of IALA National Members are built to provide commonly recognised services, for example, in the realms of Aids-to-Navigation and VTS. Therefore, they already have more or less similar architectures. e-Navigation will impact these systems by requiring harmonisation and, thus, adaptation of systems and their interfaces. The impact for existing systems is mainly in the Data Exchange part as a consequence of the provided operational services. The impact may be different for each shore based user and will depend on the services provided, in line with the Maritime Service Portfolio defined for the area.

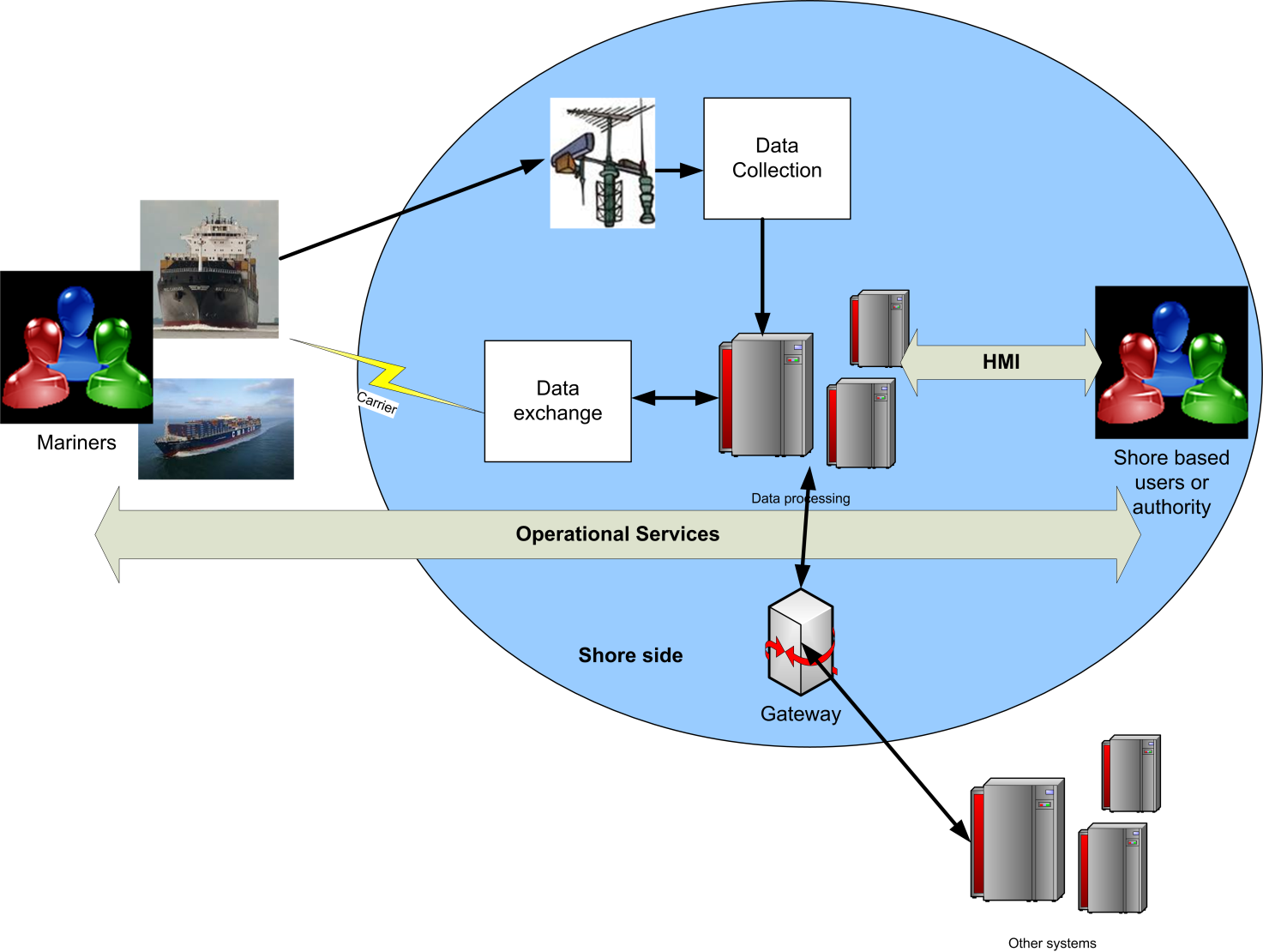


Figure 5 The Shore-based e-Navigation Architecture

By adoption of the S-100 GI Registry as the register for the product specifications, an interface is specified for the exchange of information between the different stakeholders. The data processing part is the responsibility of the regarding stakeholder, the representation and HMI is partly unified by preconditions on portrayal requirements within the Portrayal Register of the relevant domain.

The information, which can be exchanged, is independent from the medium used as carrier for the information (data). This means that usage of the operational service is not limited by one specific piece of hardware but facilitates more than one type of carrier (i.e. radio (data-)link, physical connection, internet etcetera)