

# PORT CALL OPTIMIZATION (PCO) GUIDE



Guide for Harmonized Communication  
and Electronic Exchange of Nautical  
and Operational Data for Port Calls



International  
Harbour Masters  
Association

Concept: Version 1 ©

## Document endorsement history

Date	Abbreviation	Full name
01/12/25	IAPH	International Association of Ports and Harbors
01/12/25	IHMA	International Harbour Masters Association
14/01/26	ITPCO	International Taskforce Port Call Optimization
23/01/26	MPC	MPC International PTY LTD
05/02/26	MISSION	Mission
06/02/26	DYNAPORT	Dynamic Navigation and Port Call Optimisation in Real Time
06/02/26	TIC 4.0	Terminal Industry Committee 4.0
06/02/26		Fundacion Valenciaport
16/02/26		Green Award
16/02/26		PortCall.Zero
16/02/26	IBTA	International Bulk Terminals Association
16/02/26	DiNav Marine	Digital Navigation Marine
16/02/26	GSTS	Global Spatial Technology Solutions
16/02/26		Heyport
16/02/26		NAVTOR
17/02/26		Awake.AI
19/02/26	GMF	Global Maritime Forum
19/02/26		ITS Norway
19/02/26		Wartsila Voyage Canada
20/02/26		BIMCO
23/02/26	OOW	Officers On Watch
24/02/26	WB	The World Bank
24/02/26	ICS	International Chamber of Shipping
24/02/26	HVCC	Hamburg Vessel Coordination Center GmbH

Date	Abbreviation	Full name
24/02/26	HPC	Hamburg Port Consulting
24/02/26		Innovez One
27/02/26		INTERCARGO
27/02/26		INTERTANKO
27/02/26		Teqplay
27/02/26		NextPort
27/02/26		Moffatt & Nichol
27/02/26		Made Smart Group
27/02/26		IMO Global Industry Alliance to Support Low Carbon Shipping
02/03/26	NI	The Nautical Institute
02/03/26		Kongsberg Norcontrol
05/03/26		Improko B.V.
06/03/26		Navozyme
09/03/26	ISS	Inchcape Shipping Services
10/03/26	ECASBA	European Community Associations of Shipbrokers and Agents
10/03/26	FONASBA	Federation of National Associations of Ship Agents and Brokers
12/03/26	GDSC	Green and Digital Shipping Corridor

## Endorsement Notice

The name of any organization endorsing this document will be listed in the "Document endorsement history" on this page. Endorsement will be registered after receiving a confirmation email. Endorsement is based on agreeing on the content of this document.

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# Document revision history

Date	Page	Change

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This work is a Joint Industry Paper, developed in collaboration with all PCO Initiatives and related IMO NGOs. The findings, interpretations, and conclusions expressed in this work do not reflect the views of an individual PCO Initiative.

## Custodian of this publication

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## References to this document

Please cite this document as follows: PCO Guide 2026

## Dissemination

This guide will not be disseminated until the formal submission to IMO FAL as INF paper in March 2026.

## Validation dates of document

The guide will be valid from April 1, 2026 to April 1, 2031. Then, the guide will be updated to ensure that the standards and guidelines are still up to date.

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# ACKNOWLEDGEMENTS

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The development of the PCO Guide was made possible through the collaborative efforts of numerous organizations and individuals. This work builds on a series of initiatives and milestones:

- 2023 IMO FAL 47: introduction of guidelines for Operational Data, laying the foundation for structured data exchange.
- 2024 IMO FAL 48: demonstration of exchange of nautical and operational data by the ports of Singapore and Rotterdam within the Green and Digital Shipping Corridor. During the IMO FAL meeting, PCO initiatives—including Dynaport Project (funded by the European Union), Green and Digital Shipping Corridor, IMO GIA, ITPCO, IHMA, and IAPH—aligned their work for global implementation. After the IMO FAL meeting, the PCO Network meeting in Rotterdam further defined key action items.
- 2025 IMO FAL 49: information paper regarding guidelines for Nautical Data [1]. After the IMO FAL meeting, the PCO Network meeting in Valencia agreed on the minimum scope of Nautical and Operational Data content for the PCO Guide, which was finalized based on these discussions and prior papers.
- 2026: IMO FAL 50 marks the presentation of the PCO Guide to IMO FAL. Additionally, the international API testbed was launched for ports making their nautical and operational data available.

Special recognition is extended to the following contributors and organizations for their expertise and commitment:

- Asian Development Bank
- Industry Associations: BIMCO, IALA, IAPH, IBTA, IHMA, IHO, Intercargo, Intertanko, ESPO, TIC 4.0.
- PCO Initiatives: Dynaport, Green and Digital Shipping Corridor, Mission Project, Global Maritime Forum, IMO Global Industry Alliance to Support Low Carbon Shipping, International Taskforce Port Call Optimization.
- Ports: Port of Algeciras, Amsterdam, Bremerhaven, Gothenburg, Hamburg (HVCC), Kokkola, Rotterdam, TangerMed, Valencia.
- World Bank.

Gratitude is also expressed to all members of the PCO Network and related IMO NGOs whose contributions ensured the successful completion of this guide.

# 1. EXECUTIVE SUMMARY

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Ship operators are responsible for managing a fleet of ships worldwide. On a single day, the operator may manage 100 ships in 100 different ports. And all 100 ports may have different data in different formats and standards. The data also differs between the sources, e.g., between nautical charts, port data bases, or agent information. This makes it very difficult to operate those ships in a safe and sustainable manner.

Safety Of Life At Sea (SOLAS) compliant ships have a minimum set of equipment on board according to the SOLAS requirements. While the SOLAS requirements are primarily focused on ships, ports have been asked to provide a minimum set of port call data to be available to all SOLAS ships and related parties at the same time. The data is based on port and trade agnostic standards, with the lowest form of complexity and with the largest impact on safe and sustainable operation of SOLAS ships, namely:

- Identification of the terminal and its berths
- Planned Time of Arrival at Pilot Boarding Place, Planned Time of Departure Berth

More data may be exchanged, as long as the port meets the minimum criteria.

This guide outlines how ports can join a global network of ports which provide access to this minimum set of port call data through an Application Programming Interface (API). It is built on universally accepted IMO and IHO standards which are the same for every port and every ship, ensuring consistency across all ports and ships. Additionally, it incorporates the ISO standard for location identifiers (GLN) and times, recognizing the port's central role in the global supply chain.

Recognizing that both the port and shipping industry are still in a steep learning curve and are conservative by nature, the data scope is limited, and data exchange is based on simple, yet robust techniques and existing chains of command and contracts.

The benefits are substantial: standardized, accurate and timely information enhances the efficiency and effectiveness of port calls by enabling better management of assets, resources, and personnel. In turn, this ensures greater safety and regulatory compliance, supports environmental sustainability and lower operational costs for shipping lines, shippers, terminals, ports and their nautical services which support the safe arrivals and departures.

The intended readers of this guide are harbour masters or equivalents, terminal operators, nautical service providers, IT personnel of the port, policy makers and solution providers.

**Captain Ben van Scherpenzeel**

Project Officer IHMA

## 2. ABBREVIATIONS

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<b>AIS</b>	Automatic Identification System
<b>API</b>	Application Programming Interface
<b>ATA</b>	Actual Time of Arrival
<b>ATC</b>	Actual Time of Completion
<b>ATD</b>	Actual Time of Departure
<b>BIMCO</b>	Baltic International Marine Council
<b>ECDIS</b>	Electronic Chart Display Information System
<b>EMSA</b>	European Maritime Safety Agency
<b>ENC</b>	Electronic Navigational Chart
<b>ETA</b>	Estimated Time of Arrival
<b>ETC</b>	Estimated Time of Completion
<b>ETD</b>	Estimated Time of Departure
<b>FAL</b>	Convention Facilitation of International Maritime Traffic
<b>FCFS</b>	First Come, First Served
<b>GLN</b>	Global Location Number
<b>HD ENC</b>	High Density ENC
<b>HO</b>	Hydrographic Office
<b>IAPH</b>	International Association of Ports and Harbors
<b>IEC</b>	International Electrotechnical Commission
<b>IHMA</b>	International Harbour Master Association
<b>IMO</b>	International Maritime Organization
<b>IMO GIA</b>	IMO Global Industry Alliance to Support Low Carbon Shipping
<b>IMO GISIS</b>	IMO Global Integrated Shipping Information System
<b>ISPS</b>	International Ship and Port Facility Security
<b>ITPCO</b>	International Taskforce Port Call Optimization
<b>JIT</b>	Just In Time
<b>MEPC</b>	Marine Environment Protection Committee
<b>MLC</b>	Maritime Labour Convention
<b>MMSI</b>	Maritime Mobile Service Identity

<b>MSW</b>	Maritime Single Window
<b>NOR</b>	Notice Of Readiness
<b>PCO</b>	Port Call Optimization
<b>PCS</b>	Port Community System
<b>PMIS</b>	Port Management Information System
<b>PTA</b>	Planned Time of Arrival
<b>PTC</b>	Planned Time of Completion
<b>PTD</b>	Planned Time of Departure
<b>RENC</b>	Regional Electronic Navigational Chart Coordination Center
<b>RTA</b>	Requested Time of Arrival
<b>RTD</b>	Requested Time of Departure
<b>SFTW</b>	Sail Fast, Then Wait
<b>SMDG</b>	Ship Message Design Group
<b>SOLAS</b>	Safety of Life At Sea
<b>TOS</b>	Terminal Operating System
<b>UKC</b>	Under Keel Clearance
<b>UNECE</b>	United Nations Economic Commission for Europe
<b>UN/LOCODE</b>	United Nations Code for Trade and Transport Locations
<b>VAR</b>	Value Added Resellers
<b>VDES</b>	VHF Data Exchange System
<b>VHF</b>	Very High Frequency
<b>VTS</b>	Vessel Traffic Services
<b>WGS 84</b>	World Geodetic System 1984

# PORT CALL OPTIMIZATION



## 3. PORT CALL OPTIMIZATION (PCO)

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### 3.1. What is port call optimization?

A port call is the arrival and departure of a ship at a particular port as part of its journey or itinerary. During a single port call, the ship may call at one or multiple berths. Port call optimization is the name of optimizing this process.

### 3.2. What are the benefits of port call optimization?

Standardized, accurate and timely information enhances the efficiency and effectiveness of port calls by enabling better management of assets, resources, and personnel. In turn, this ensures greater safety and regulatory compliance, supports environmental sustainability and lowest operational costs for shipping lines, shippers, terminals, ports and their nautical services which support the safe arrivals and departures.

### 3.3. What is the port call process?

To optimize a port call, it is important to first have an understanding of the port call process.

The diagram on the next pages is based on the high-level business process for port calls [4] initially developed by the International Taskforce Port Call Optimization (ITPCO).

This high-level business process is based on IMO regulations, industry contracts, like BIMCO, requirements of port authorities and other stakeholders, making it a port and trade agnostic process. It has been validated during industry roundtable sessions organized by the IMO Global Industry Alliance to Support Low Carbon Shipping (Low Carbon GIA). [3]

See also the appendix of the port call process [5] for more detailed explanations and the business process video [6] for a quick introduction.

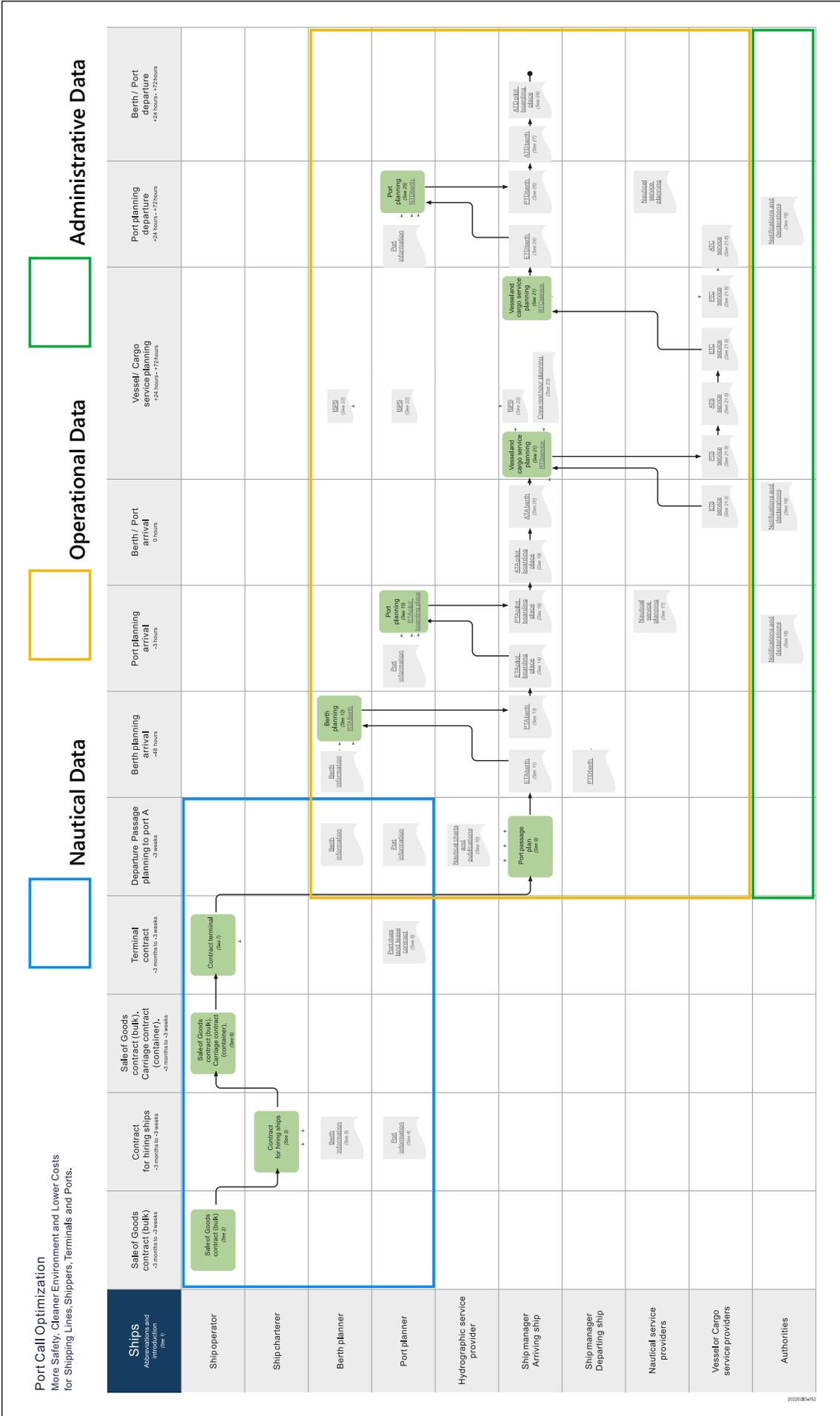


Figure 1 on previous page: the port call process

## The steps in the port call process (horizontal column)

### Contractual phase

- 1) Sale of goods contract (bulk sector)
- 2) Contract for chartering ships
- 3) Sale of goods contract (bulk sector), carriage contract (container sector)
- 4) Terminal contract

### Operational phase

- 1) Passage planning
- 2) Berth planning arrival
- 3) Port planning arrival
- 4) Ship / Cargo service planning
- 5) Port / berth arrival
- 6) Ship / Cargo service
- 7) Berth planning departure
- 8) Port planning departure
- 9) Berth / port departure

## The port call actors in the port call process (left hand vertical column)

### General

The actors can be represented by several different real stakeholders, dependent on the governance structure of the port, the ship management organization, the VTS/pilot organization, the port and terminal organization, and the type of trade etc. Definitions have been made in such a way that the name of the actor can apply to any port and any ship and include the following:

### Link to the standards

Guidelines For Harmonized Communication And Electronic Exchange of Operational Data For Port Calls – IMO FAL5/Circ. 52. [2]

The definitions below are an exact copy of this document.

## Ship operator

Party that decides how the ship is employed and where a ship is to call. Depending on the commercial operation conditions, for example, but not limited to: ship charterer, ship owner, cargo owner / trader, ship manager, carrier, parties representing / acting on behalf of before mentioned parties

## Ship charterer

Person or company who hires a ship from a shipowner for a period of time

## Berth planner

Party that plans the berth call. Depending on the organization of the port, for example, but not limited to: terminal operator, berth operator, port authority, VTS

## Port planner

Party that plans the port call. Depending on the organization of the port, for example, but not limited to: port authority, harbour master, terminal operator, VTS, pilots, coast guard

## Hydrographic service provider

Party that undertakes to arrange for the collection and compilation of hydrographic data and the publication, dissemination and keeping up to date of all nautical information necessary for safe navigation. For example, but not limited to: national hydrographic office, regional charting agency

## Ship manager

Party responsible for the day to day management, operation and maintenance of the ship. For example, but not limited to: shore side ship manager, or other party that acts on behalf of shore side ship manager, for example but not limited to: port captain, Captain of the ship or ship agent which handles for example, authorities' reporting requirements or some of the other information requested by any of the parties

## Nautical service providers

Party that provides nautical services to the ship. For example, but not limited to: pilots, tugs, linesmen, boatmen, VTS

## Ship services

Services related to the ship, For example but not limited to: bunkers, lube oil, potable water, provisions, stores, waste per IMO/MARPOL class, repairs, vetting, flag survey, periodic maintenance

## Cargo services

Services related to the cargo, for example but not limited to: cargo handling, cargo survey, lashing

## Authorities

Party that receives information related to the port call, provides clearance to the ship's arrival and departure. For example, but not limited to: harbour master, customs, immigration, port health, port VTS, coastguard

## 3.4. What data is exchanged in the port call process?

### 3.4.1 Nautical data – blue boundary in figure

Nautical data are necessary for navigation (SOLAS use), chartering and planning (non-SOLAS use) of ships.

Data for SOLAS use is provided by hydrographic offices in navigational charts, nautical publications or coast pilots and tide tables. Hydrographic offices collect data from ports.

Data for non-SOLAS use is provided by the same ports, but is normally collected by different parties, e.g., but not limited to: ship managers, ship operators, ship charterers.

Examples of nautical data include the location of terminal, berths, port waiting areas ship particulars at berth and in port passages, depths and tides, meteorological information, nautical services, communication procedures, and port emergency procedures.

### 3.4.2 Operational data – yellow boundary in figure

Operational data are necessary for planning or execution of operations. It is used to facilitate the day-to-day planning of ships, the berths and their related services.

This data may currently not be shared with any other party (e.g., starting and completion times of services of a terminal service is not shared with the ship manager).

Examples of operational data include arrival and departure times of ships, starting and completion times of nautical, and cargo and ship services.

### 3.4.3 Administrative data – green boundary in figure

Administrative data is submitted by ships or other non-authority parties to authorities in notifications and declarations, commonly via the Maritime Single Window.

The data is based on legislation or regulations. This type of data can normally be shared between the authority parties covered by said legislation but can normally not be shared with non-authority users.

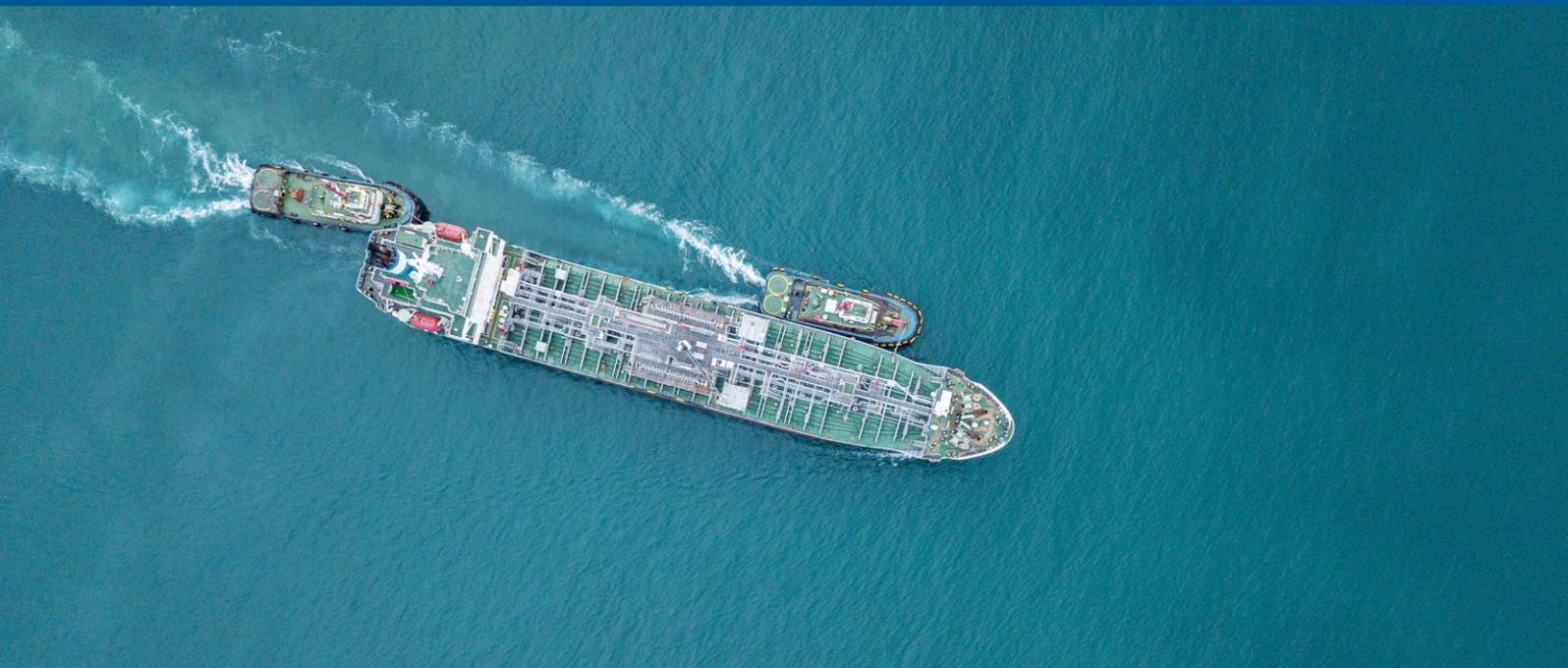
Examples: notifications and declarations to port authorities, customs, immigration, and health.

Administrative data is important, especially as they can contribute to crew fatigue and delays between nearby ports. However, most port authorities do not control the Maritime Single Window (MSW)<sup>1</sup>. Therefore, this data set is excluded from the scope of this guide.

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<sup>1</sup> IMO definition of MSW: “a one-stop service environment that covers maritime and port administrative procedures, such as port entry/departure declaration, notice of security reports, and other related information between private sectors and public authorities nationwide”

# NAUTICAL DATA



## 4. NAUTICAL DATA

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### 4.1. Nautical data in the business process

This section outlines the role of the data set within the port call process, and how the data is utilized by various stakeholders.

#### Contract for hiring ships

If the party responsible for transport does not own a ship, a ship needs to be hired (chartered). The ship charterer needs to sign a contract with the (despondent) ship owner or (despondent) operator, the so-called charter party. In this charter party, the ship charterer promises to the ship owner to take the ship to a safe port. The ship charterer uses shore-based databases and applications to select ships and make a ship-berth compatibility check, to ensure that the selected berth is safe.

#### Passage planning

A master is responsible for making a voyage plan from berth-to-berth. The master should primarily use nautical charts (Electronic Navigational Charts, so called ENCs) and nautical publications which are issued by or on the authority of a government-authorized hydrographic office or other relevant government institution. Only these publications fulfill the SOLAS carriage requirements. An important part of the voyage plan is the port-passage plan: it is a detailed description of the passage from the waiting area to the berth and vice versa.

#### Berth and port planning

The port admission policy is based on the port's nautical data and used on a daily basis to grant approval for arriving and departing ships.

Furthermore, notifications and declarations to authorities are based on unique and agreed-on identifiers of terminals and berths.

## 4.2. Nautical data from regulatory and legal point of view

This section outlines the legal implications and requirements associated with this data set.

### General

Broad guidance is needed to help ports to disclose nautical data. Ports must answer the question: "Is it better or worse to provide nautical data or to keep it private?"

### SOLAS – Safety of Life at Sea

Masters of ships are obliged to navigate berth-to-berth as per IMO Resolution A.893(21) [9], Guidelines for voyage planning, section 1.3: *"Voyage and passage planning includes appraisal, i.e., gathering all information relevant to the contemplated voyage or passage; detailed planning of the whole voyage or passage from berth-to-berth, including those areas necessitating the presence of a pilot"*.

As per SOLAS [8] Chapter V Regulation 2, Nautical Charts and Publications used for safe navigation in ports and berths are issued officially by or on the authority of a government-authorized Hydrographic Office or other relevant government institution. This is in alignment with the provisions of SOLAS Chapter V Regulation 9: *"Contracting Governments undertake to arrange for the collection and compilation of hydrographic data and the publication, dissemination and keeping up to date of all nautical information necessary for safe navigation" and "Contracting Governments undertake to ensure the greatest possible uniformity in charts and nautical publications and to take into account, whenever possible, relevant international resolutions and recommendations."*

### Clauses in charter parties

A common clause in a charter party is that a ship charterer may send a ship only to a safe port and to a berth that is safe and where it can always lie afloat. In other words, the ship charterer has to warrant the owner the safety of the place to which the ship charterer intends to send the ship. Therefore, the risk of a port or berth being unsafe is generally very often primarily on the ship charterer. Or, as a minimum, the ship charterer should demonstrate "due diligence".

### Legal position of data publisher

Based on a number of court cases against hydrographic offices the broad advice is:

- Do all that is reasonably practical
- Do what the reasonable hydrographer would have done

It is also important to correctly address the expectations of data users, and to clearly indicate the purpose, function and intended use of data. A "duty of care metadata", so to speak. This can be done through as so-called "Notice of Intended Use" (see [appendix 2 for an example](#)).

### Legal options to organize data sharing between berth planner and port authority

So far, the sharing of only the terminal and berth names, has not been leading to the need of a data sharing agreement. If you collect data, it is always good to mention for which purpose the data will be used (e.g., for safe navigation).

## Legal options to organize data sharing between port authority and hydrographic office

For EU member states: in the EU the “Open Data Directive<sup>2</sup>” is in force. Each EU member state must implement this directive in its own national legislation. However, implementation may differ between member states, but each member state’s legislation must contain the minimum requirements as determined in the EU Directive.

### Steps to be taken:

- 1) Public parties must comply with this “Open Data Directive”. Therefore, it’s good to first check whether the port authority is indeed a public party.
- 2) If you’re considered to be a public party, then it’s important to know that data which has been collected through a public organization must be shared with open standards, so one does not need a license to read the data.

The only exception is if the data concerns critical infrastructure data.

- 3) No exclusive sharing: data must be accessible to all parties, and parties must be able to re-use the data.
- 4) Data sharing is based on not for profit, but costs for sharing can be charged. This also applies to the data publisher who receives the data from a public party.

For non-EU members states: not known at this moment.

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<sup>2</sup> <https://eur-lex.europa.eu/EN/legal-content/summary/open-data-and-the-reuse-of-public-sector-information.html>

### 4.3. Nautical data scope

This section outlines the minimum scope of this data set based on the principle of "basics and compliance first".

#### Selection of data elements as a first step

The two locations which have been identified as most critical:

- Terminal: unique identifier, name, position, and type
- Berth: unique identifier, name, position, and type

This holds only for those terminals and berths which receive the SOLAS ships.

Per port more data may be exchanged, as long as the port meets the minimum criteria; same as for equipment on board of SOLAS ships.

#### Benefits

Ship charterer:

- Ship charterer will find the same information in the nautical chart and nautical publications as in the port data bases that the ship charterer may have for ship-berth compatibility check prior to chartering the ship. This may lead to less idle time of ships waiting for the tide to enter port, or ships that need to lighter to reach the berth. This also reduces GHG emissions.

Ship operator:

- Ship operator will find the same information in the nautical chart and nautical publications as in the port data bases that the ship operator may have for berth to berth navigation. This may improve better port passage planning and result in less incidents and accidents.

Ship manager:

- Up to date, ENCs improve safe navigation berth-to-berth.

Hydrographic service provider:

- For the exchange of terminal and berth locations there were different sources of information. It is not hard to imagine how much time and effort it takes to regularly check those different sources, particularly in case the number of terminals and berths is high, and the number of sources is high too; not even mentioning the error sensitivity.
- Using the unique identifiers for terminals and berths, the hydrographic service now has the ability to identify only the changes in each data set, versus cross checking the total data set for changes. This allows them to produce more reliable ENCs and significantly reduce their processing time: after an update of the port, the new ENC will be available to the ship much more quickly.
- First implementation in September 2025 show that roughly 50% of the terminals had a wrong terminal type and/or name.

## Compliance

It is compliant with the SOLAS regulation chapter 9 and safe port and safe berth charter party clauses.

## Next steps

Other data elements for chartering and navigation will be addressed at a later stage:

- Port waiting areas
- Ship particulars at berth and in port passage: maximum permitted sizes (e.g., length, beam, draught, and air draught)
- Depths and tides
- Meteorological information
- Availability of nautical services (e.g., VTS, pilots, tugs, linesmen, and icebreakers)
- Communication procedures
- Port emergency procedures

## 4.4. Nautical data exchange

This section outlines the current methods of data exchange, respecting existing technologies and the minimum requirements for the SOLAS ships. It emphasizes the importance of not interfering with the current "chain of command" and maintaining the integrity of established communication channels.

### General

Hydrographic offices normally collect nautical data from the governmental entities in charge (e.g., port authority), depending on when new data becomes available. The geo scope is normally limited to the national waters including adjacent ports. Hydrographic offices of the IHO Nautical Information Provision Working Group (NIPWG) experience a lack of data availability and consistency by ports, resulting in hydrographic offices being unwilling to publish port infrastructure data in their nautical charts and publications as they cannot guarantee the correctness of the data.

The ports are not always aware that the nautical chart is not up to date, as not all ports have nautical charts in their office. Ports receive multiple requests in multiple formats with multiple standards to provide nautical data, making it very challenging to provide unambiguous data.

The ship charterers normally collect their nautical data about twice per year through e.g., – but not limited to – agents, terminals, and surveyors. However, these parties do not have an obligation to provide such data, nor is the accuracy of data verifiable. The standards used are often trade specific (e.g., the bulk segment uses different standards than the tanker segment or the container segment).

As hydrographic offices and ship charterers collect their nautical data from different parties, at different times and with different definitions, it is inevitable that the same ship is chartered, navigated, planned and permitted based on different data sets which may result in e.g., a mismatch in berth compatibility.

Therefore, efforts should be made to ensure that ports, hydrographic offices and ship charterers start using consistent standards (e.g., how do we define a terminal and berth) and that they all have access to the same data at the same time from the data holder.

### Data ownership

Nautical data from the port are owned by an authority, e.g., the harbour master, being a public body to govern the collection and dissemination. He/she may reach out to the berth planners, as they're the best persons to know the exact names which are used in the daily planning of the berth, verified by the authority for consistency with other berths. Terminal and berth names are not commercially sensitive data, and no problems have been encountered in that sense to collect data.

### Data user – Hydrographic service provider

Through the API, the hydrographic service providers can process the data versus through e.g., emails or port ENCs, and after processing the data publish an updated Electronic Navigational Chart. (ENC).

### Data user – Ship operator

Through the ENC from the Hydrographic service provider, the ship operator receives the updated data and display it in the Electronic Chart Display Information System (ECDIS) on board.

## Data user – Ship charterer

Through the API, the ship charterer can process the data in back office applications for chartering of ships.

## Ease of data exchange

The ports need a common method to exchange nautical data to connect one-to-many and decrease the administrative burden and the risk of human error.

An Application Programming Interface (API) is used to exchange data from:

- Customer data base (e.g., in ports with a landlord system)
- Geographic Information System (GIS) database
- Excel sheet (lowest for of complexity)

## Data compatibility

For ships, the IMO has assigned since 1987 unique numbers, the so-called IMO Ship Number, which remains unchanged during the lifetime of the ship, and which is used across databases. This IMO Ship Number is routinely linked with other codes, e.g., MMSI<sup>3</sup> or Call Sign. If the name or Call Sign changes due to change of the ownership, data compatibility is not lost.

For the ports, the UNECE-maintained UN/LOCODE has been internationally adopted as the standard way of uniquely identifying the individual ports. The IMO has also established a registry for the port's different ISPS-facilities through its GISIS database.

Generally, for terminals and berths there was no agreed-on standard for unique numbers, they're normally only identified by name. When the name changes, e.g., due to change of ownership, or if due to geopolitical issues the name of the area changes, data compatibility is lost. Apart from changing names, finding data based on names can be cumbersome due to spelling errors or spelling differences. For this reason, most port data bases assign their own unique numbers to locations. However, these numbers are for internal purposes and not shared with users.

Therefore, this guide introduces the Global Location Number (GLN) as the globally unique reference code to exchange data from terminals and berths. The GLN is already used in the global supply chain since 1996, ensuring both data compatibility and connection to the supply chain. It is an existing ISO standard (ISO/IEC 6523) that applies for all locations and is already used hundreds of millions of times across data bases all over the world.

Same as the IMO Ship Number, the GLN is linked with other codes, e.g., Port Facility Number (for ISPS terminals only), UN/LOCODE (for ports only), is compatible with the future Interoperability Identifier of IHO and it also has a format which can easily be recognised.

The combination of both globally unique numbers for ships and berths ensure a robust ship-berth compatibility check for chartering, navigation, planning and admission policy.

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<sup>3</sup> Maritime Mobile Service Identity

## Data quality – general

As indicated in the report “Port Call Optimization through Data Quality” [7], data quality is a precondition for effective port call optimization. The following sections provide some guidance regarding the most relevant data quality aspects for nautical data.

## Data quality – accuracy

For terminal location the accuracy is not an issue, as it is a “centre of gravity”.

For berth location the accuracy is not an issue for conventional mooring, as the master and pilot manoeuvre the ship to the fender line by eyesight. For future automatic docking, the precise location of the fender line is critical, as this is where the ship should have come to a full stop, 100% parallel to the fender line. Then also it becomes more important that the reference code is globally unique.

## Data quality – frequency

The reliability of data goes up by use. By providing access to an API, all parties can use the same data in their daily operations, and any errors will be detected on a daily basis.

If data is not used in operations and not shared by API, terminal and berth data are normally reviewed by the managers of the port data bases every 6 to 12 months, which is the current routine of most port data bases.

## 4.5. Nautical data implementation recommendations

This section outlines lessons learned from previous implementations, along with metrics for measuring the effects of data implementation.

### General

As nautical data involves much less stakeholders than operational data, and is also much more static, it is recommended to start with nautical data first.

While the guide provides a general framework, it acknowledges that every port has unique characteristics and may require tailored adaptations. Recommendations are based on feedback from ports with hands-on experience.

### Implementation step by step – general

- 1) Identify all sources with terminal and berth data.
- 2) Look at the data model of the data.
- 3) Compare the data model to the international data model and adjust where necessary.
- 4) Complete data fields through consultation of berth planners.
- 5) Join the PCO Network by activating the API for nautical data.

### Considerations regarding data maturity level of the port

For the ports with no database-stored data about terminals and berth, the “spreadsheet or workbook” option is the best, having no impact on other systems.

For the ports with data in customer or GIS databases, current operational systems may need to be adjusted. As port infrastructure is usually part of the backbone of other systems, the impact might be severe. The best thing is to start with a pilot with different types of terminals to get a full understanding of the way the international standards should be implemented for the terminals and berths. Those lessons learned from the conducted pilot should then be translated to the action plan for all other terminals and berths.

### Considerations regarding introduction of international standards in a local port community

For both options mentioned above, it has to be considered that old names of terminals and berths, which have ceased to exist long time ago may still be in use. People are used to referring to these old terminals and berths by their old names, and acceptance of the “new” names which are today used by the berth planner requires some change management among parties like Nautical service providers and ship managers. This applies more to old ports than to new ports.

### Measuring the effects

A hydrographic office which is already using an API to exchange nautical data, has been asked to measure the effect of the implementation: e.g., the number of terminals and berths that were incorrect, or the reduction of process time between receiving data and producing an updated Electronic Navigational Chart (ENC).

### Persons with hands on expertise

Enquiries should be directed to [Scherpenzeel.ehmc@harbourmaster.org](mailto:Scherpenzeel.ehmc@harbourmaster.org)

## 4.6. Nautical data non-technical standards

This section outlines the non-technical standards (semantics). They're a critical starting point for defining the exchange of data between systems. They are provided to ensure consistent understanding and interpretation across different stakeholders. They are 100% based on existing IHO and IMO definitions.

### Link to the non-technical standards

IHO Concept Register: [10]; the Concept Register is basically a terminology register, and the exact definitions of this register have been copied in this chapter.

The identifiers for both terminal and berth have been selected so they apply to any terminal and to any ship; trade specific identifiers have not been used.

### Definitions – Terminal

#### Terminal

**Definition:** a terminal covers that area on shore which provides buildings and constructions for the transfer of cargo or passengers from and to ships.

#### Interoperability Identifier

**Definition:** a common globally unique identifier for entities which describe a single real in world feature, and which is used to identify instances of the feature in end-user systems where the feature may be included in multiple data product types.

**Format:** ISO/IEC 6523 (Global Location Number, GLN); 13 digits in text format, is compatible with the IHO identifier for nautical data, and with ISO 19987 for supply chain data.

**Acquiring GLNs:** It is through a global organisation called GS1 and is cost-effective (not-for-profit); contact your national GS1 office or select a GS1 office abroad (prices vary per GS1 office<sup>4</sup>)

**Assigning GLNs to locations:** Works the same as for ships: if the location changes ownership or in size, the number remains the same. The only thing that is different: if a location is split up in two, the principle is to keep the GLN for the largest location and assign a new one for the additional location.

#### Name

**Definition:** the individual name of a feature.

**Format:** text, possibly combined with name of terminal name for better human recognition.

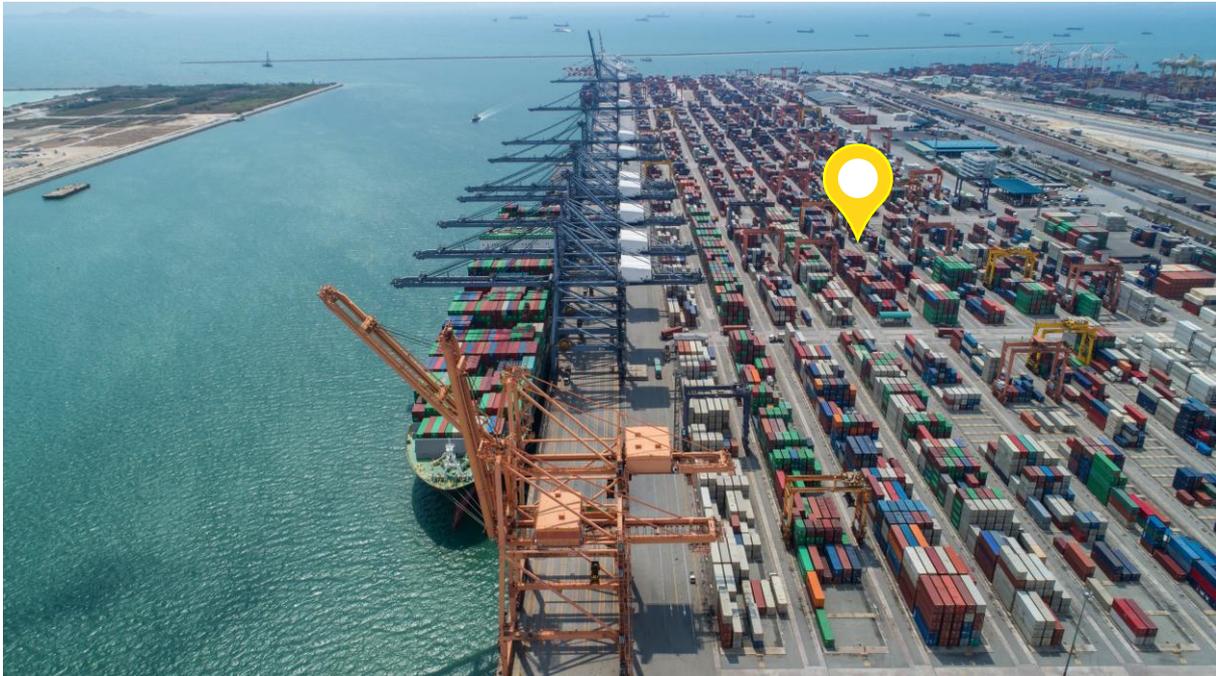
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<sup>4</sup> In general, a one-off price plus an annual fee will apply. One-off costs may vary from 0.03 USD to more than 30.00 USD per GLN. Annual fees are dependent on annual turn-over of the organization and start from zero to typically a hundred or so USD. Multi-billion turn-over organizations may be charged higher amounts

## Geographic(al) latitude and longitude

**Definition:** a general term, applying alike to astronomical and geodetic latitudes and longitudes.

**Format:** for information exchange, it is degrees and decimal minutes and datum WGS84; for data exchange, it is decimal degrees to a defined precision (minus to indicate south and west) and datum WGS84. For terminals a center of gravity is chosen.



Terminal

## Port Facility Number

**Definition:** a number assigned to the port facility in the IMO port facility database<sup>5</sup>.

**Format:** UN/LOCODE followed by a 4-digit code separated with a dash

## Terminal – Types

- Bulk terminal: A terminal for the handling of bulk materials such as iron ore, coal, etc.
- Container terminal: A terminal with facilities to load/unload or store shipping containers.
- Ferry terminal: A terminal for passenger and vehicle ferries.
- Passenger terminal: A terminal for the loading and unloading of passengers.
- Ro-Ro terminal: A terminal for roll-on roll-off ferries with facilities to load/unload or store shipping containers.
- Tanker terminal: A terminal for the bulk handling of liquid cargoes.

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<sup>5</sup> <https://gisis.imo.org/Public/ISPS/Default.aspx>

## Definitions – Berth

### Berth

**Definition:** a place, generally named or numbered, where a ship may moor or anchor.

**Remark:**

- The relation to berth pockets is that along a berth, the bodies of water (berth pockets) may have different depths. So, one berth may have multiple berth pockets, depending on the berth position (bollard number), the depth is different.
- The relation to berth positions is that one berth normally has many berth positions, e.g., the ship is positioned between specified bollards, or at a specified manifold or ramp.

### Interoperability Identifier

**Definition:** a common globally unique identifier for entities which describe a single real in world feature, and which is used to identify instances of the feature in end-user systems, where the feature may be included in multiple data product types.

**Format:** ISO/IEC 6523 (Global Location Number, GLN); 13 digits in text format, is compatible with the IHO identifier for nautical data, and with ISO 19987 for supply chain data.

**Acquiring GLNs:** through a global organisation called GS1, which is cost-effective (not-for-profit); contact your national GS1 office or select a GS1 office abroad (prices vary per GS1 office)

**Assigning GLNs to locations:** Works the same as for ships: if the location changes ownership or in size, the number remains the same. Only thing that different is, if a location is split up in two, the principle is to keep the GLN for the largest location and assign a new one for the additional location.

### Name

**Definition:** the individual name of a feature.

**Format:** text; possibly combined with the terminal name for better human recognition.

## Geographic(al) latitude and longitude

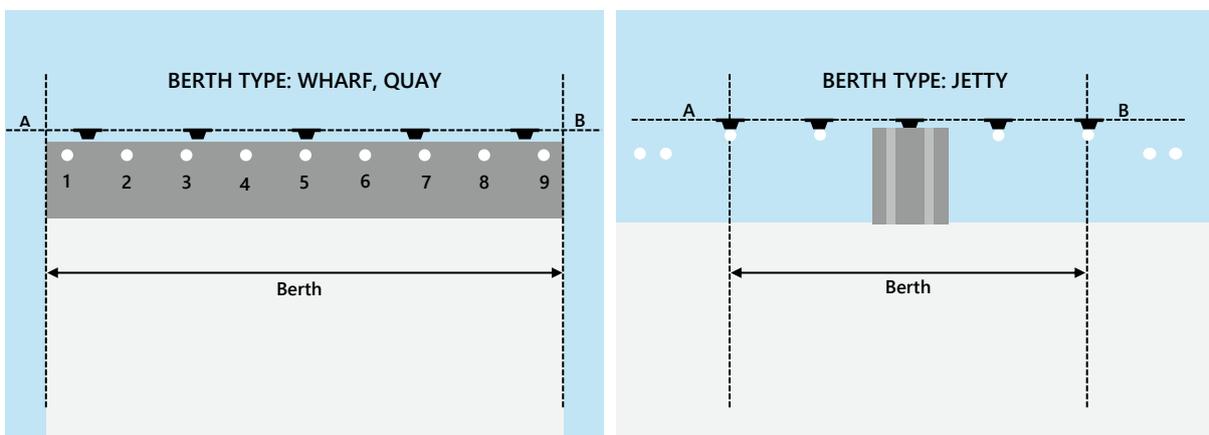
**Definition:** a general term, applying alike to astronomical and geodetic latitudes and longitudes

**Remark:**

- The berth's extent is between its two extremities measured in a straight line, indicated by A and B, and the orientation is not important. The line represents the fender line, an imaginary line parallel to face of berth or quay which touches the seaward face of the fenders. Being the position of the ship's side when alongside and very important for docking the ship, for gangway lengths and where depths along the berth start to play a role for the maximum draught of the ship.



Berth indication



Berth exact position: fender line

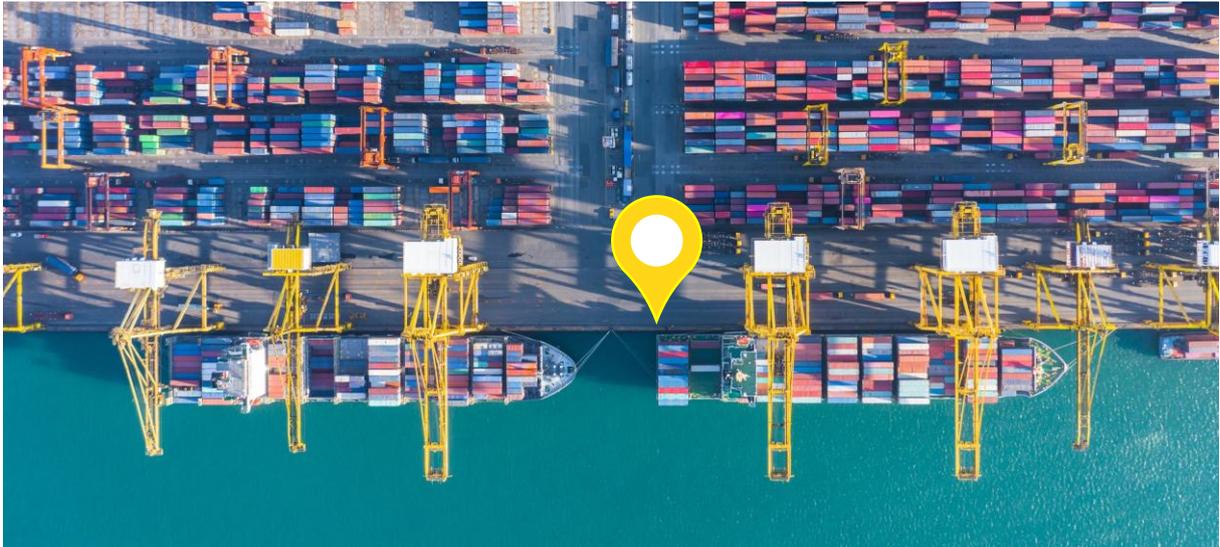
## Berth – Types

- **Anchor Berth:** a designated area of water where a ship, sea plane, etc., may anchor.
- **Fender or Breasting Dolphin:** a post or group of posts driven into the seabed or riverbed, used to assist in the berthing of the ships by taking up some berthing loads, keep the ships from pressing against the pier structure, or to protect structures from possible impact by the ships.
- **Multi Buoy Mooring (MBM) Berth:** a designated facility where a ship may moor, usually by a combination of mooring buoys and the ship's anchors.
- **Open Face Wharf:** a wharf supported on piles or other structures which allow free circulation of water under the wharf.
- **Pier (Jetty):** a long, narrow structure extending into the water to afford a berthing place for the ships, to serve as a promenade, etc.
- **Pontoon:** floating structure, usually rectangular in shape which serves as landing, pierhead or bridge support.
- **Quay:** a wharf approximately parallel to the shoreline and accommodating ships on one side only, the other side being attached to the shore. It is usually solid construction, as contrasted with the open pile construction usually used for piers.
- **Solid Face Wharf:** a wharf consisting of a solid wall of concrete, masonry, wood etc., such that the water cannot circulate freely under the wharf. The type of construction affects ship-handling; for example, a solid face wharf may give shelter from tidal streams, but under certain circumstances a cushion of water may build up between such a wharf and a ship attempting to berth at it, causing difficulties in ship handling.
- **Tie-Up Wall:** a section of wall designated for tying-up ships awaiting transit. Bollards and mooring devices are available for both large and small ships.

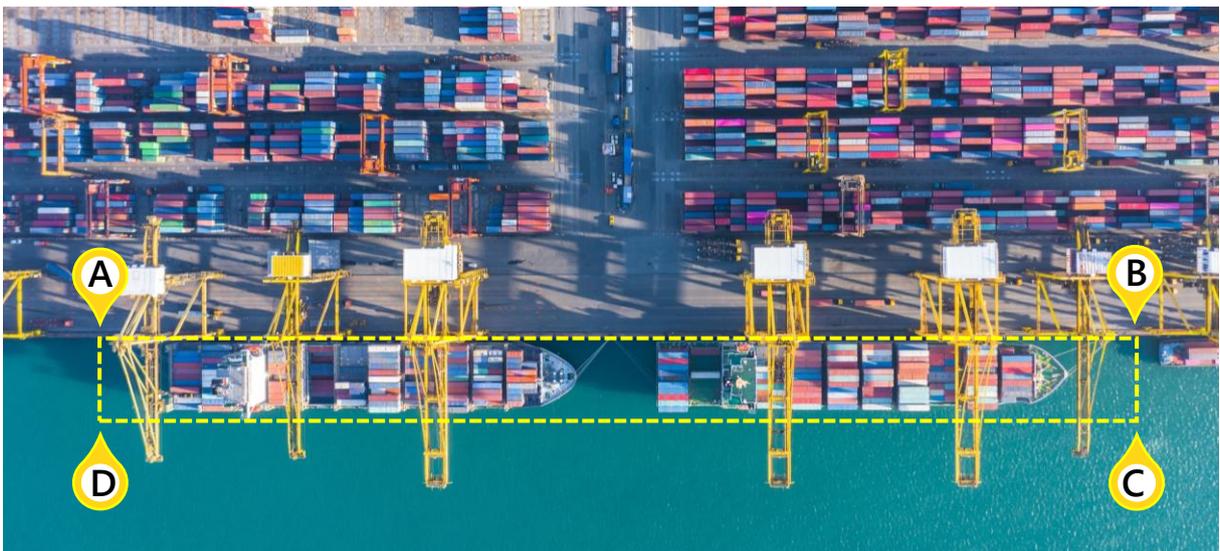
## Berth related objects

Not part of the minimum data set, but important to understand the relation to the berth are:

- **Berth position:** A specific position within a berth where a ship may be moored or anchored (e.g., reference to a bollard number, meter mark number, loading arm / manifold number, or ramp number)
- **Berth pocket:** A body of water at a berth or anchor berth, of adequate dimensions to allow a ship to make fast to the shore, mooring buoy, berthing dolphins or to anchor



Berth position



Berth pocket

## 4.7. Nautical data technical standards

This section outlines the technical standards. They are provided to facilitate seamless data exchange between computer systems. This includes specifications for the APIs and other digital interfaces that support automated data sharing. They can be built on many different formats (e.g., JSON, XML, html, etc.) – these are just languages, all different kinds of messages can be written in these languages if they are conformant with non-technical standards.

### Link to the technical standards

Technical standards are based on JSON, given the initially limited number of ports and based on push data only.

The standard is aligned with S-131, and both exist side by side.

JSON allows data to be organized hierarchically. For example, a terminal contains berths. This structure allows all related details to be retrieved in a single API response. The Nautical API is also designed for administrative databases that are not geo-based, where such hierarchies are common.

GeoJSON, by contrast, is a standardized format for encoding geographic data structures using JSON. It is used in GIS (Geographic Information Systems) applications because it can represent geometries such as points (e.g., a buoy), lines (e.g., a shipping route), and polygons (e.g., a harbor area). GeoJSON typically also contains properties (metadata) linked to each geometry, and is well-suited for visualization on maps and for spatial queries. However, the format assumes a layer-based structure rather than hierarchical relationships. In practice, GeoJSON does not support hierarchical data. It uses separate tables (layers) for different entities, linking them through identifiers (e.g., a berth stores the terminal's ID). Retrieving related details requires multiple API calls—first to obtain an entity, then to look up its related entities. This makes JSON more suitable for systems that work naturally with hierarchies, while GeoJSON is optimized for geographic systems, which typically operate on layered data structures.

The authentication for the API can be implemented using either an API Subscription Key or OAuth 2.0. For nautical data, which is typically low in sensitivity, an API Subscription Key provides sufficient protection and is easy to manage.

The response to the query to the API results in a full data set where one receives one consolidated data file. This eliminates the need for more sophisticated queries and authentications.

All names in the API have been harmonized with the IHO Registry and following the naming conventions (camelCase).

However, long field names need to be avoided to avoid larger response but should also not be too short to allow intuitive recognition with the original definition.

Therefore, e.g., “interoperability identifier” has been shortened to “id”. This is clear for each developer and often used in APIs and yet aligned with the definition.

The same applies for “geographic latitude and longitude”, which is a long field name too, and one can see that latitude and longitude is present in the API, so the name was shortened to “geographicalCoordinate”

For the geographical coordinates of berths, we use an array of geographical locations. If the array contains a single item, then it is a point. If it contains 2 items, then it is a line. If it contains 4 points then it is a boundary, e.g. for a Multi Buoy Mooring (MBM) Berth.

The array of geographical coordinates is defined as an array with named property latitude and longitude. This approach does not follow certain geographical standards (such as arrays of vectors or strings with space-separated vectors), because those formats are harder to read and more difficult for systems or humans to interpret.

## Terminal – API response

```
{
  "id": "8719331161350",
  "name": "Rotterdam World Gateway",
  "geographicalCoordinate": {
    "latitude": 51.95076,
    "longitude": 3.984636
  },
  "portFacilityNumber": "NLRTM-0467",
  "terminalType": "ContainerTerminal"
}
```

## Berth – API response

```
{
  "id": "8719331164764",
  "name": "DS QUAY",
  "berthType": "Quay",
  "unloCode": "NLRTM",
  "geographicalCoordinates": [
    {
      "latitude": 51.947823,
      "longitude": 3.986751
    },
    {
      "latitude": 51.956442,
      "longitude": 3.995982
    }
  ]
}
```

# OPERATIONAL DATA



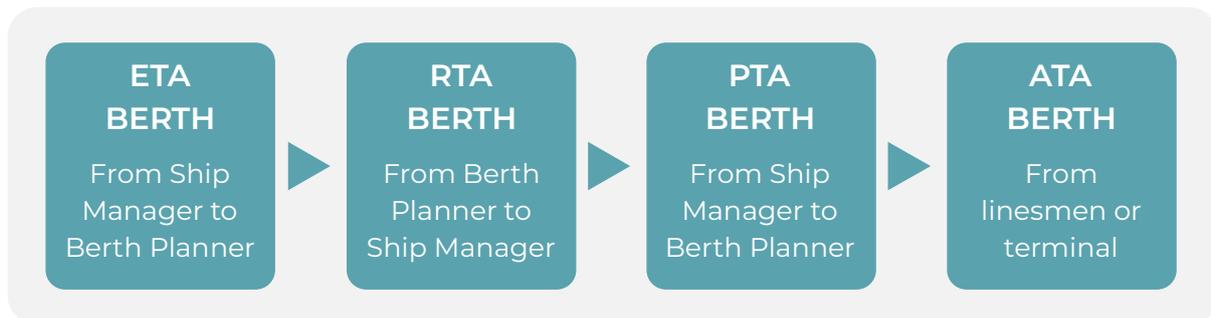
## 5. OPERATIONAL DATA

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### 5.1. Operational data in the business process

This section outlines the role of the data set within the port call process, and how the data is utilized by various stakeholders.

#### Berth planning arrival – General



#### Berth planning arrival – ETA Berth

##### General

The berth planning is fundamental for the port planning: it makes no sense to plan a ship to the Pilot Boarding Place if the berth is not available. That's why berth planning comes first.

The Estimated Time of Arrival Berth (ETA Berth) is sent by the ship manager to the berth planner.

ETA Berth may be derived from ETA Pilot Boarding Place as this is what the master normally reports.

It is based on distance to go and speed over ground. The ship manager is contracted by the ship charterer or ship operator and is responsible for informing all parties ashore on behalf of the Ship. Normally the update frequency increases ("narrowing down"), when the ship gets closer to its destination. ETA Berth may also be part of the administrative data, as notification or declaration to authorities.

##### Tramp shipping

Normally in tramp shipping, the ships do not sail on a regular schedule: the cargo can change ownership during the voyage and can change which terminal the ship is sent to. In line with ship the communication procedure in the charter party, the ship manager sends an ETA Berth to the berth planner. If there are more loads/parcels on board, the ship manager will send an ETA Berth to each berth planner (e.g. in a parcel tanker).

##### Liner shipping

Normally in liner shipping, the ships sail with a rotation and pro forma schedule. A rotation schedule shows which ports will be visited and in which sequence. The pro-forma schedule shows more details regarding dates and times. The exact dates and times may change due to prevailing conditions (e.g., canal transits, tidal restrictions and national holidays of ports called).

In liner shipping, a ship may also call at multiple terminals (e.g., feeders). In that case, the ship manager will send an ETA Berth to each berth planner.

## Berth planning arrival – RTA Berth

### General

The Requested Time of Arrival Berth (RTA Berth) is sent by the berth planner to the ship manager.

It is based on ETA Berth. The RTA Berth is a request of the berth planner to the ship manager to come alongside at a particular berthing position at a particular time and is based on the planning of multiple ships at the berths of the terminal. Today schedules are often based on *first come, first served* (FCFS), meaning the ship does not receive an RTA Berth before it arrives in the Waiting Area resulting in *sail fast, then wait* (SFTW).

### Tramp shipping

The berth planner normally makes the berth planning of the terminal. The terminal is not a party to the charter party. However, the ship charterer is mostly linked to the terminal through the terminal service contract, so demurrage could be on the account of the terminal. Therefore, the berth planner might prioritize a ship which causes less demurrage costs versus another ship – being the reason why berth planning can be considered as sensitive information.

### Liner shipping

If the terminal is serving only one customer, the planning is normally not sensitive. However, if the terminal is serving multiple customers (i.e. "multi-user terminal"), or even a customer who owns the terminal, that customer might be given preference over another customer – making the information sensitive.

## Berth planning arrival – PTA Berth

### General

The Planned Time of Arrival Berth (PTA Berth) is sent by the ship manager to the berth planner.

It is based on accepting the RTA Berth of the berth planner.

### Tramp shipping

The ship might receive multiple RTAs of several berth planners. The ship accepts the RTA Berth of one berth planner. That choice can depend on commercial and safety considerations, e.g. which parcel is needed most at which terminal or a quick port rotation. Restrictions in the port rotation (e.g., due to draught) may also have an impact.

### Liner shipping

The ship might receive multiple RTAs of several berth planners. The ship selects the right rotation which results in the shortest and safest port stay.

## Berth planning arrival – ATA Berth

The Actual Time of Arrival Berth is often discussed: is it commence mooring, last line secured, all fast, etc. In line with the International Regulations for Preventing Collisions at Sea (1972), rule 3(i): *The word "underway" means that a ship is not at anchor, or made fast to the shore, or aground.* Therefore, the definition of ATA Berth is First Line Secured.

If berths are equipped with automated mooring systems, it would be the first pad which is secured to the ship.

Most important is that all stakeholders within the port community are defining it the same way aligned with international standards.

## Port planning arrival – General



### Port planning arrival – PTA Berth as starting point

The Planned Time of Arrival Berth (PTA Berth) is sent from the ship manager to the port planner.

### Port planning arrival – RTA Pilot Boarding Place (RTA PBP)

The Requested Time of Arrival Pilot Boarding Place (RTA PBP) is sent by the port planner to the ship manager.

It is based on the PTA Berth. The RTA PBP is a request of the port planner to the ship manager to arrive at a particular Pilot Boarding Place at a particular time. The port planner provides an RTA PBP taking into account:

- 1) Sailing time between pilot boarding place and berth
- 2) Clearances of other authorities (customs, immigration, port health)
- 3) Maximum sizes of the ship (length, beam, draught, air-draught)
- 4) Maximum conditions for the ship (tide, wind, visibility, swell)
- 5) Berth availability (from berth planner)
- 6) Fairway availability (from port planner)
- 7) Availability of the nautical services (from Nautical service providers)

Conditions 1) to 6) are all necessary to ensure that it makes sense to start planning in the first place. Condition 7) is an interaction between the port planner and nautical service providers.

If the RTA pilot boarding place is not aligned with the PTA Berth, it is important to explain whether this is due to an act of God or due to lack of nautical services – as this might stop or shorten discussions regarding who's picking up the bill for delays (ship charterer or ship operator).

### Port planning arrival – PTA Pilot Boarding Place (PTA PBP)

The PTA PBP is sent by the ship manager to the port planner.

It is based on accepting the RTA PBP of the port planner. Communication between the ship manager and the port planner is normally local through e.g., the Port Community System.

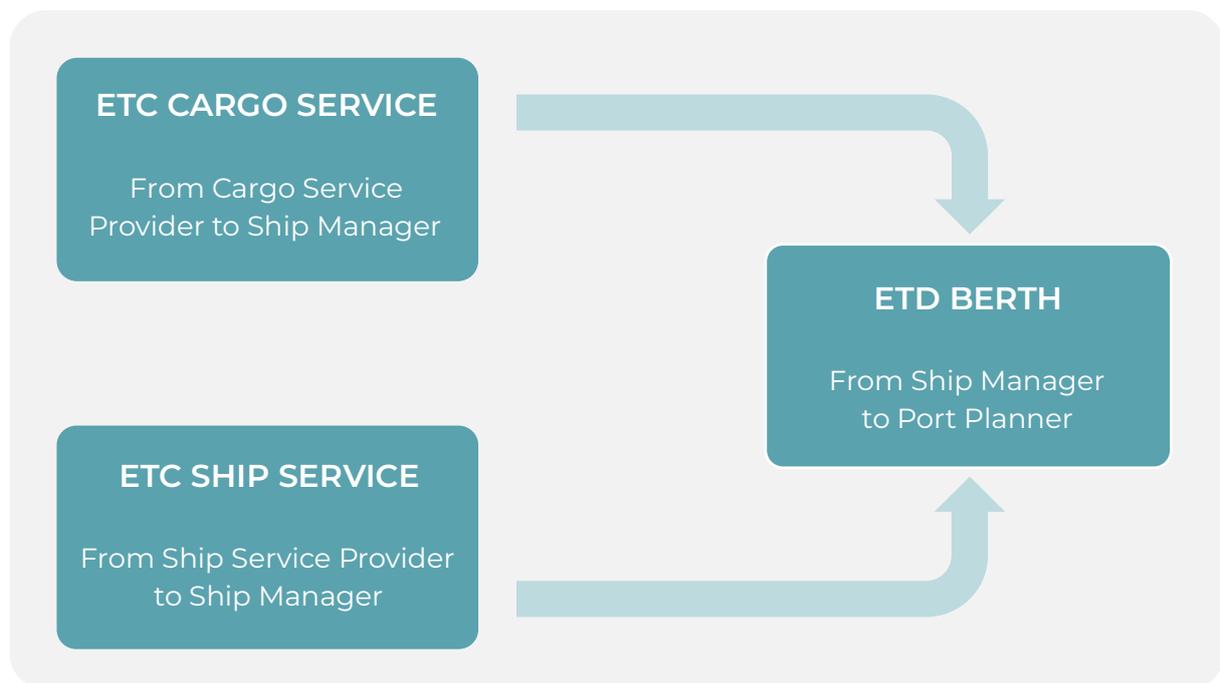
For ships which do not need a pilot, the Pilot Boarding Place can be used as a reference point for starting the Port-passage.

## Port planning arrival – ATA Pilot Boarding Place (ATA PBP)

The Actual Time of Arrival Pilot Boarding Place (ATA PBP) is often discussed: the exact position of a Pilot Boarding Place is only the position of the Pilot Boarding Place in the nautical chart. However, this is an indication, and the exact boarding position of the pilot depends on wind direction, swell or traffic. Therefore, ATA Berth is more accurate than ATA Pilot Boarding Place.

## Cargo and Ship service planning – General

The Estimated Time of Completion of the different Cargo and Ship services lead to the Estimated Time of Departure Berth (ETD Berth). Some ship services are critical and must be completed before departure (e.g., supply of medicines), others may not be critical as they can be provided in the next port, and are not impacting the ETD Berth.



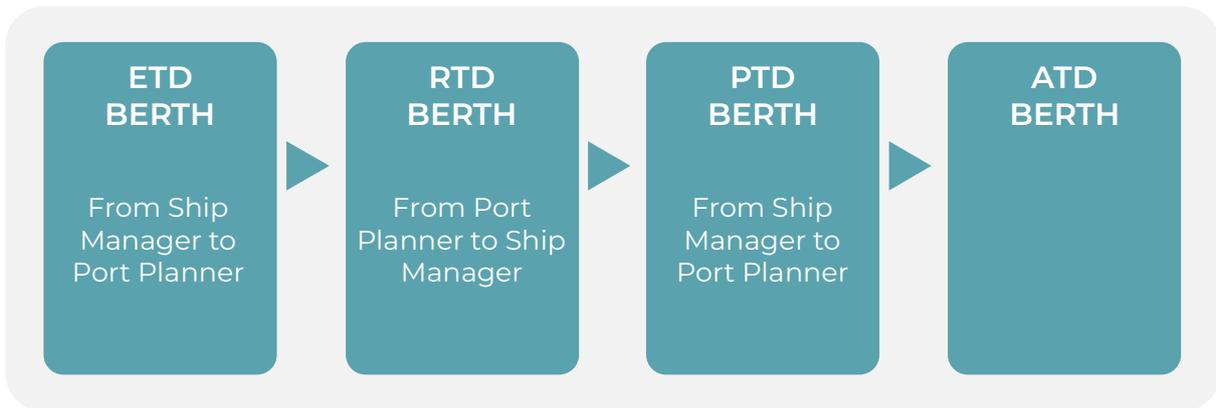
## Cargo service planning – ETC Cargo service

The Estimated Time of Completion Cargo service (ETC Cargo service), e.g., the terminal, is sent by the cargo service provider to the ship manager. The service is completed when the ship can safely depart, i.e. at what time the first line can be released.

## Ship service planning – ETC Ship service

The Estimated Time of Completion Ship service (ETC Ship service), e.g., a bunker barge, is sent by the ship service provider to the ship manager. The service is completed when the ship can safely depart, i.e. at what time the first line can be released.

## Port planning departure – General



## Port planning departure – ETD Berth

### General

The Estimated Time of Departure Berth (ETD Berth) is sent by the ship manager to the port planner.

It is based on the Estimated Time of Completion (ETCs) of all cargo and ship services.

If the Berth is needed for a berth exchange (meaning exchange with another ship), the ETD Berth is the most critical time stamp for the Port planning of the next ship.

The nautical services can be ordered based on the ETC for cargo and ship services, as then the first line can be released. As the release of lines normally takes less than 10 minutes, basically the ETC for the last of the cargo and ship services and the ETD Berth for the ship are the same.

However, for larger ships, especially container ships over 300 meters with large gangways, one need to include 15–30 minutes additional time (e.g., order for nautical services starting 12.00, ETD 12.15).

### Tramp shipping

The ETD Berth is normally not sensitive.

### Liner shipping

The ETD Berth is normally not sensitive.

## Port planning departure – RTD Berth

### General

The Requested Time of Departure Berth (RTD Berth) is sent by the port planner to the ship manager.

It is based on ETD Berth. The RTD Berth is a request of the port planner to the ship manager to depart from the berth. The Port planner provides an RTD Berth taking into account:

- 1) Clearances of other authorities (customs, immigration, port health)
- 2) Maximum sizes of the ship (length, beam, draught, air-draught)
- 3) Maximum conditions for the ship (tide, wind, visibility, and swell)
- 4) Berth availability (from berth planner)
- 5) Fairway availability (from port planner)

6) Availability of the nautical services (from tugs, pilots, linemen)

Conditions 1) to 5) are all necessary to ensure that it makes sense to start planning in the first place.

Condition 6) is an interaction between the port planner and nautical service providers.

The port planner also plans departure times for internal port movements, but the clearance process is a bit different.

If the ETD Berth changes due to a change of one of the ETCs, all these conditions need to be evaluated again, and may lead to an updated RTD Berth – which again needs to be confirmed resulting in an updated PTD Berth.

### Port planning departure – PTD Berth

The Planned Time of Departure Berth (PTD Berth) is sent by the ship manager to the port planner. It is based on accepting the RTD Berth. Communication between the ship manager and the port planner is normally local through e.g., the Port Community System.

### Port planning departure – ATD Berth

The Actual Time of Departure Berth is often discussed: is it commence unmooring, last line, etc. In line with the International Regulations for Preventing Collisions at Sea (1972), rule 3(i): *The word "underway" means that a ship is not at anchor, or made fast to the shore, or aground.* Therefore, the definition of ATD Berth is Last Line Released.

If berths are equipped with automated mooring systems, it would be the last pad which is released from the ship.

Most important is that all stakeholders within the port community are defining it the same way aligned with international standards.

## 5.2. Operational data from regulatory and legal point of view

This section outlines the legal implications and requirements associated with this data set.

### Declarations and notifications to Port Authorities

Estimated Time of Arrival and Departure is always part of notifications and declarations to Port Authorities.

#### IMO MEPC.323(74)

*Invitation to Member States to encourage voluntary cooperation between the port and shipping sectors to contribute to reducing GHG emissions from ships. Noting that the Initial Strategy calls for the encouragement of port developments and activities globally to facilitate reduction of GHG emissions from shipping, including provision of ship and shoreside / onshore power supply from renewable sources, infrastructure to support supply of alternative low-carbon and zero-carbon fuels, and to further optimize the logistic chain and its planning, including ports.*

### Maritime Labour Convention

On all ships (of signatories of the convention), the master has to comply with the Maritime Labour Convention [12], taking care of wages, food, outfitting of cabins, but most important to the port call process; the rest hours of the crew.

Therefore, it is important for the ship to understand the ETC of each service and the PTD Berth and PTA Pilot Boarding Place to avoid unnecessary waiting hours of the crew. In turn, it benefits the service provider if the crew is standing by on completion.

### Clauses in charter parties

Most ships in tramp shipping sail under a voyage charter party. After loading the cargo in the load port under common law, and in most other jurisdictions, and under most voyage charter parties, the master has an obligation to proceed on the voyage to the discharge port with due despatch, i.e., without justifiable delay, without deviating and with the charter speed as agreed in the charter party. Clear wording in charter parties, bills of lading and other contracts of carriage are needed to protect owners from claims for breach of the due despatch obligation. As a result, the ship operator cannot optimize speed based on the PTA Pilot Boarding Place without the risk of negative contractual and commercial consequences, resulting in waiting in the Waiting Area. New contracts with so-called "Virtual Arrival" or "Just In Time" clauses have tried to address this. However, the uptake of such clauses has been limited according to BIMCO. Parties hesitate to charter ships with a new clause due to the lack of jurisprudence, and possible disputes may lead to lengthy and costly court cases with an uncertain outcome. On top of this, the financial benefits of bunker savings is insignificant when compared to the financial risks related to the cargo. Therefore, parties will want to align with existing and well-tried contractual arrangements.

However, in most existing contractual arrangements, the ship operator must comply with whatever port regulations are in effect. No different to when a port is closed due to weather, the ship operator must act upon other instructions from the port. The majority of the charter parties have a clause stating that owners are responsible to comply with the port regulations and restrictions. The port authority can include in their port regulations a requirement not to arrive early in the Waiting Area (WA) and allow the ship to reduce speed in the port-passage Planning Area (PPA) by securing its

place in the berth and port planning. For full transparency with commercial interests, it must be clear when the ship was seen by the berth and port planner as an “arrived ship” (after entering the PPA), and when the ship would have arrived in the Waiting Area based on charter speed. This transparency avoids discussions between commercial parties regarding, e.g., demurrage. Extremely useful is if all parties can see the ship movement on maps with the Waiting Area and Port passage Planning Area clearly indicated and when the ship has come to a full stop.

For definitions of areas please see appendix.

## **Legal options to organize data sharing between port planner and berth planner**

### **General**

In most ports, the port planner is often a public organization, and the berth planner is often a private organization. Usually sharing data between port planner and berth planner is not well organized and it is often a challenge to do so. The following options have been identified to overcome this challenge.

### **Option 1 – National Port Act**

Data sharing agreements can be organized nationally and/or locally. National arrangements are easier for the port, as they can refer in their local port regulations to the National Port Act, and enforce it with the national mandate.

Both options have been implemented in ports, and examples are provided in Appendix.

### **Option 2 – Covenant: berth planner and port planner**

Local arrangements are more difficult for the port, as they have to agree with the terminals one by one to sign a covenant or to have sufficient authority to design and implement a new port regulation.

### **Option 3 – Port regulation**

If the covenant between berth planner and port planner works out well, one can consider turning the covenant into a port regulation, making it applicable for all berth planners.

### **Option 4 – Port Marine Safety Code**

The Port Marine Safety Code is used in UK ports. It has no legal standing; it's voluntary. However, if something happens, the first check in court is whether the port was following an approved code of practice. Today, the code is for ports only. The code is currently being reviewed to extend the code to terminals.

### **Option 5 – Land Lease Contract**

In ports where the port authority is also the landlord, it may be a part of the Land Lease Contract. However, this contract is per terminal, and to change this, it requires bilateral agreements for all terminals.

## 5.3. Operational data scope

This section outlines the minimum scope of this data set based on the principle of "basics and compliance first".

### Selection of data elements as a first step – for data exchange in and outside port limits

The two times which have been identified as most critical:

- Planned Time of Arrival Pilot Boarding Place (PTA PBP)
- Planned Time of Departure Berth (PTD Berth)

This holds only for SOLAS ships.

Per port more data may be exchanged, as long as the port meets the minimum criteria; same as for equipment on board of SOLAS ships.

For the Planned Time of Arrival Pilot Boarding Place, it is crucial to specify which Pilot Boarding Place, as the intermediate distance between the different Pilot Boarding Places can be considerable, and, with limited speed, the sailing time between them can make a substantial difference on arrival time. A name will suffice for Pilot Boarding Places, since these are locations that cannot be sold and/or change names (as opposed to terminals and berths)

For the Planned Time of Departure Berth it's not crucial to specify which berth, as there's limited impact on the arrival time in the next port, so a name will suffice for now. In the future, the unique number needs to be used for more compatibility with other data (e.g., Port-passage plans, in-port berth-to-berth movements, etc.).

### Benefits

The concept of port call optimization focuses on a seamless connection between berth and port planning. The benefits are different per party:

#### Ship operator, ship charterer, and ship manager:

- Early notice of a PTA Pilot Boarding Place allows the ship to optimize speed, weather routing, avoid drifting or anchoring or running the ship up to near the sea bouy to become an "arrived ship" for the purpose of laytime calculations, resulting in reduced fuel and lubrication oil consumption, fewer accidents in anchorages, less hull fouling and less risk of piracy in affected areas. Provided that the ship is contractually allowed to reduce speed or as per port regulation.
- Early notice of PTD allows to plan e.g., maintenance, bunkers or crew change without taking the ship off-hire and may even allow rescheduling with the next ship charterer resulting in less idle time
- Reduced uncertainty allows the freight traders/ship brokers to market the ship off tighter [dates and could potentially allow the laycan to be narrowed.](#)
- Improved compliance to Maritime Labor Convention (MLC) due to improved rest hour planning.

### Port planner:

- Optimized port processes
- Better capacity planning of fairways
- Increased safety and reduced risk of collisions
- Reduced emissions in the port area

### Berth planner:

- Better capacity planning of berths
- Better capacity planning of resources

### Nautical service providers:

- Better capacity planning
- Better planning of maintenance

### Ship or Cargo service providers:

- Better capacity planning
- Better planning of maintenance

### Not related to the port call process, but to the entire supply chain:

- Better supply chain visibility
- Improved predictability of cargo whereabouts and of availability for connected transportation
- Better planning of type and timing of hinterland modalities
- Optimized stock management – reduction of safety-stock

The two time-stamps are also important for nearby ports, since a delay in a nearby port can affect the next port.

## Compliance

- Compliant with IMO MEPC.304(72) [11]
- Compliant with MLC [12]

## Selection of data elements – for data exchange inside port limits

Data elements that have been selected are all necessary to realize a reliable Planned Time of Arrival Pilot Boarding Place and Planned Time of Departure Berth, but do not need to be provided through an API outside the port limits:

### Berth planning Arrival

- 1) ETA Berth
- 2) RTA Berth
- 3) PTA Berth

### Port planning arrival

- 4) RTA Pilot Boarding Place

5) PTA Pilot Boarding Place

Berth / Port arrival

6) ATA Pilot Boarding Place

7) ATA Berth

Ship / Cargo service planning

8) ETC Terminal

9) ETC Bunkers

Port planning departure

10) ETD Berth

11) RTD Berth

12) PTD Berth

Berth/Port departure

13) ATD Berth

The exchange with parties inside the port limits do not require international standards for electronic exchange. However, common understanding of the definitions according to the international standards is key even within a single port.

## 5.4. Operational data exchange

This section outlines the current methods of data exchange, respecting existing technologies and the minimum requirements for the SOLAS ships. It emphasizes the importance of not interfering with the current "chain of command" and maintaining the integrity of established communication channels.

### General

In realizing Just In Time operations, the coordination between the berth and the port planning is fundamental, including the nautical services which are related to a proper planning of arrival and departure. For this reason, many more parties are involved to organize and share operational data, compared with nautical data, and, therefore it is more complex to optimize the operational processes.

### Data ownership

Operational data from the port (PTA Pilot Boarding Place, PTD Berth) are owned by an authority, e.g., the harbour master, being a public body to govern the collection and dissemination as he/she is in charge as the port planner. He/she may reach out to the berth planners and nautical service providers to organize the port planning.

Berth planners are the best persons to know the exact arrival and departure times in the daily planning of the berth, which are fundamental for planning of the public fairways. Berth planners normally like to share data if this results in optimizing their own planning of assets and/or resources, or the maintenance of their assets.

However, they don't like to share data if:

- The benefits are not sufficient enough in relation to the cost to overcome the technical issues
- They have to enter data twice
- The data is commercially sensitive

The first and second issue are technical: how to connect the berth planning system to the port planning system.

The third issue is commercial: which data is sensitive to share with whom and at what time. This can be addressed by ensuring that data is only shared with those services that have an impact on their planning.

Nautical service providers are the best persons to know the available capacity to allow safe passage of the public fairways.

When nautical service providers operate independently of the port planner, it is more difficult to exchange data. It all depends on the technical specifications of their resource planning systems.

When nautical service providers are in competition with one another (e.g., tug operators), then it is important to ensure the data is only used by the port planner.

### Data user – Ship operator – General

Most ships need approval from their ship operator to reduce speed, as this decision may have commercial implications. Once granted, the speed instructions are usually communicated to the ship

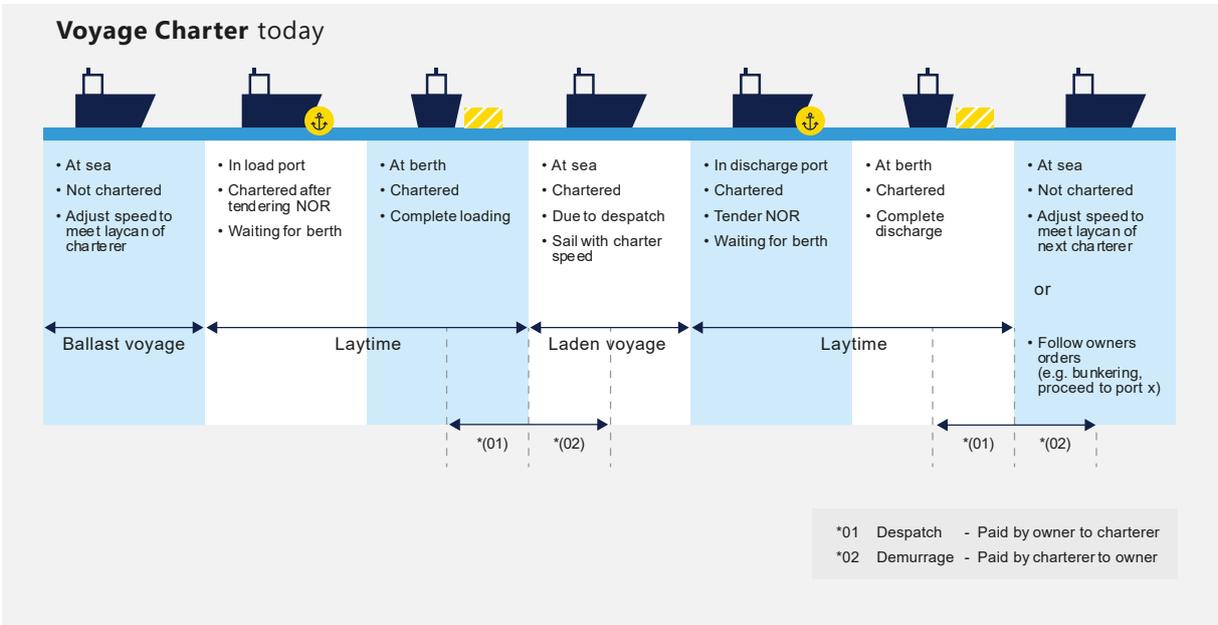
through existing channels like email or telephone. In the end it is the ship’s master who is ultimately responsible for safe navigation, and who needs to concur with the suggested speed instruction. If a ship reduces speed based on a direct connection with the port, it may create confusion if the shoreside organization is unaware of this change. This lack of coordination can disrupt the timing of related services such as bunkering and provisioning, but also crew changes. They all need to be coordinated and completed prior to the departure of the ship.

### Data user – Ship operator – Tramp shipping

If the ship is not chartered, the ship operator is in charge, acting on the basis of the next charter party (if already known).

### Data user – Ship charterer – Tramp shipping

If the ship is chartered, the ship charterer is in charge, acting on the basis of the charter party as agreed with the ship operator.



### Data user – Ship operator – Liner shipping

The speed decisions in the large container lines are normally taken by a fleet center or marine planner. These fleet centers typically oversee multiple ports within their region, resulting in container lines having several fleet centers distributed across their sailing areas.

Fleet centers make decisions for both their own fleet, and for chartered ships. For chartered ships speed instructions may be subject to the area they sail in (e.g., areas affected by piracy or war).

Most fleet centers are connected to their terminals, and they may run different cycles:

- A four-week cycle for a rough schedule planning, including ocean crossing.
- A two-week cycle for detailed planning based on the berth planning of terminals.
- A daily cycle, for finalizing related services such as bunkers and provisions etc.

The responsibility for giving speed instructions to ships varies:

- Some fleet centers give speed instructions from berth-to-berth, based on input from the port.
- Some fleet centers provide speed instructions only for long passages (ocean passages), and the local agent gives speed instructions during the short passages (port approach), especially if the local agency is managed by the container line itself.

Most fleet centers are not yet integrated with ports' systems for more detailed planning based on port availability, which includes factors like fairway access, pilots, tugs and Acts of God like severe weather conditions. Fleet centers also face difficulties connecting to data from 3<sup>rd</sup> party terminals, and they also experience a lack of coordination between the berth planners and port planners.

## Ease of data exchange – outside port limits

The ports need a common method to exchange operational data to connect one-to-many and decrease the administrative burden and the risk of human error.

An Application Programming Interface (API) is used to exchange data from:

- Port Community System (PCS)
- Port Management Information System (PMIS)
- Maritime Single Window (if also used as PCS)
- Terminal Operating System (TOS), if so equipped
- Excell sheet (lowest form of complexity)

## Ease of data exchange – inside port limits

A commonly used information platform is essential to enable coordinated decision-making; allowing all parties to look at the same data at the same time is fundamental. For large ports, where several services may be needed, and where ships may call in multiple terminals, it is obvious that the coordination process can become very complex. For small ports, this process is simpler and may not need any special support systems.

The electronic exchange of data between parties, however, has benefits for all ports, including the following:

- A reduction in telephone calls
- An acknowledgement of receipt of the information may be returned automatically.
- It avoids dependency on email systems and associated problems, e.g. when operators are on leave, when mail is caught by spam filters, or if mails are overlooked etcetera.
- All involved are on the same page and are not working with outdated information.

Therefore, for the in-port coordination process for both smaller and larger ports, a software support platform may be useful.

Larger ports may have a port platform, called Port Community System (PCS) (e.g., Port of Algeciras, Port of Gothenburg, and Port of Rotterdam<sup>6</sup>).

Smaller ports may not have a PCS, and may also have limited IT resources. The options in this case are to:

1. Connect to a Maritime Single Window and use it to supply some of the PCS services (e.g., USA, Norway, Finland and Portugal<sup>7</sup>)
2. Connect to a common commercial system acting as or similar to a PCS (e.g., UK, Norway)
3. Connect to the management system of the national authority (e.g., state managed ports in Spain, and South Africa)

Explanation of the differences between a Port Community System (PCS) and the Maritime Single Window (MSW):

- A MSW covers business-to-government data. Run by administration or authority on a national level. It collects all mandatory FAL data based on national law on what a ship has to report.
- A PCS is operated by private operators. It looks similar to a MSW and has similar functionality. It can be used as a front end for MSW, so mandatory reporting can be done through the PCS. The PCS is typically used within the port and normally used as a common platform for the coordination of logistics and port operations. A PCS may be integrated with a Port Management Information System (PMIS) and Terminal Operating System (TOS) and may be connected to VTS as well.

The functionality of the platform for sharing operational data should:

- Provide a suitable interface to the port and berth planners to make relevant data available to them and to alert operators when actions are required. The interface may be implemented as web interface for human beings or implemented as APIs in the port or terminal management systems to access data.
- Provide data protection to ensure that sensitive data is not made available to parties that should not have access to that data, for instance competing terminals or service providers. For example, information related to the cargo loading and discharge may need to be protected.

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<sup>6</sup> According to a World Bank Report (issued 2024), at least a total of 222 ports worldwide has a PCS in operation. <https://documents1.worldbank.org/curated/en/099092624152038561/pdf/P176587-54dd3e7b-e083-43cc-9df3-10b441697c0d.pdf#page=17>

The report also notes, all ports with the highest scores on the World Bank's Logistics Performance Index are running a PCS <https://www.worldbank.org/en/topic/trade/publication/port-community-systems-driving-trade-in-the-21st-century>

<sup>7</sup> Portuguese Logistics Single Window (JUL); <https://projeto-jul.pt/en>

## Data compatibility

For ships, the IMO has assigned since 1987 unique numbers, the IMO Ship Number, which remains unchanged during the lifetime of the ship, and which is used across data bases. This IMO Ship Number is routinely linked with other codes, e.g., MMSI or Call Sign. If the name or Call Sign changes due to change of ownership, data compatibility is not lost.

## Data quality – general

As indicated in the report “Port Call Optimization through Data Quality” [7], data quality is a pre-condition for effective port call optimization. The following sections provide some guidance regarding the most relevant data quality aspects for operational data.

## Data quality – accuracy

Time stamps have different meanings from one terminal to the other, or even from one terminal operator to the other. Therefore, having the same understanding of the meaning of a time is already a big step forward in the data quality.

## Data quality – frequency

Today, in most ports, the ship manager calls the berth planner by telephone to request updates – which is the data user asking the data holder for updates (pull data) and therefore always running behind facts (if not automated, e.g., a query every 5 minutes). If the berth planner sends digital updates to the ship manager, meaning that the data holder sends data to a data user (push data), and data is always up to date.

## 5.5. Operational data implementation recommendations

This section outlines lessons learned from previous implementations, along with metrics for measuring the effects of data implementation.

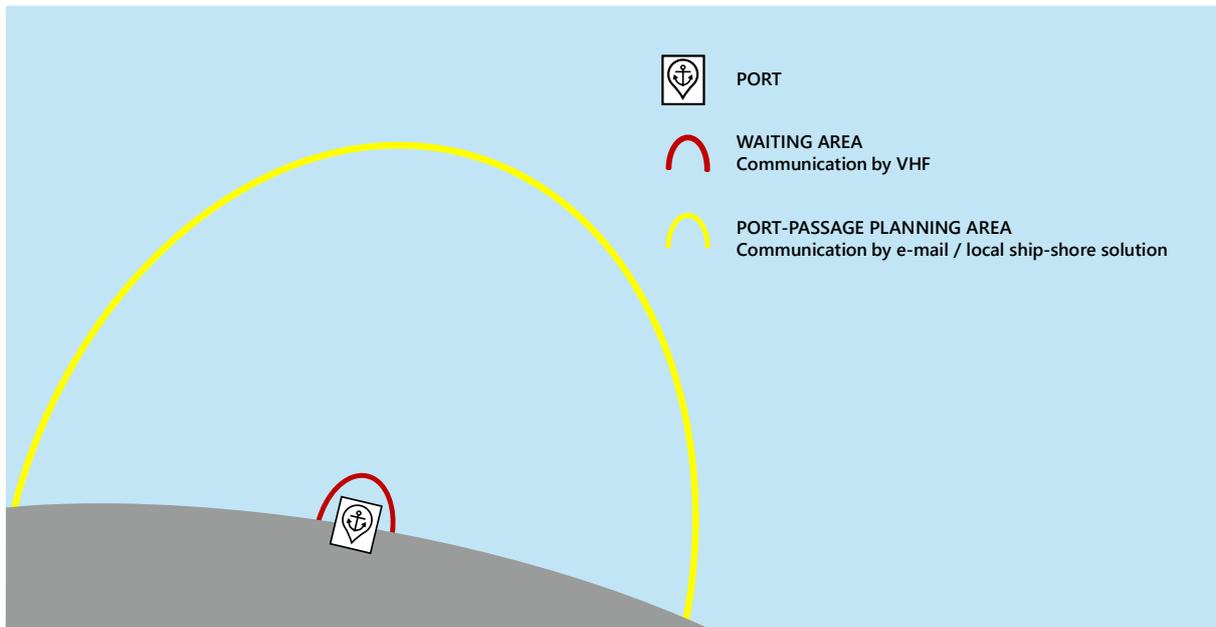
### General

As Operational Data involves much more stakeholders than nautical data, and is also much more dynamic, it is recommended to start with nautical data first.

While the guide provides a general framework, it acknowledges that every port has unique characteristics and may require tailored adaptations. Recommendations are based on feedback from ports with hands-on experience.

### Implementation step by step – General

- 1) Understanding internal port operations is the first step.  
Come together as entire port community: ship operators, ship managers, berth and port planners, nautical service providers. Make it a customer driven approach.
- 2) Create together one report that specifies how to reduce the idle time of berths and ships and make better use of capacity nautical services.
- 3) Agree to speak the same international language regarding time stamps; but flexibility is key.
- 4) Agree to identify, based on these time stamps, the first two largest bottlenecks.
- 5) Agree on how to organize data sharing formally, ensuring transparency, trust and true collaboration.
- 6) Agree on how to organize data sharing technically.
- 7) Agree on berth planning is leading (customer approach).
- 8) Agree on translating berth planning into port planning (sailing times).
- 9) Sequencing ship arrival and departures in advance will be the final milestone to enable ships to optimize speed and reduce time in the Waiting Area: the earlier the more effect.  
Therefore, alerting the berth planner that the ship has passed the Port passage Planning Area (e.g., by geo fence and AIS) and asking the berth planner if there's already an agreed berth planning (PTA Berth) is key to provide an early PTA Pilot Boarding Place.
- 10) Join the PCO Network by activating the API for Operational Data



## Considerations per shipping segment – Liner shipping

- 1) Liner shipping is easier than Tramp shipping: there are no contractual barriers for the ship to reduce speed
- 2) Start with the large ships first: they normally visit one berth only and they are easier to tackle than feeder ships which have a more dynamic planning and frequently call at multiple berths during a single port call.
- 3) Start connecting to ports nearby which have the largest impact on berth planning.

## Considerations per shipping segment – Tramp shipping

- 1) Tramp shipping is more difficult than Liner shipping: there're contractual barriers and normally there's mistrust between ship owners and ship charterers
- 2) Implementation with laden ships, as the ship is under ship charterer's orders and has no tank or hold cleaning and/or inspections.
- 3) Implementation by ship with one cargo for one terminal – ships with calls to multiple terminals normally do not need to wait anyway.
- 4) Terminals with refineries, production plants or power plants have a more predictable Berth planning compared to terminals which are involved in trading, resulting in continued schedule changes.

## Considerations regarding introduction of international standards in a local port community

A bridge between international and local standards could be to keep the local language as is in the displays, but start using the international standards in the data exchange. This requires a translation between the local port community terminology and the IMO terminology.

## Measuring the effects

- Measuring the effects should be done through a common Key Performance Indicator (KPIs) which is the same for all parties – versus individual KPIs.
- Making it customer focused, with the KPI of the terminal (idle time berth) as a starting point. One can create a dashboard for PTA Berth versus ATA Berth on arrival, and PTD Berth versus ATD Berth on departure. Including the reasons for delay, e.g., cargo services, bunker service, or stowaway search, lashing checks, etc. All these services need to be completed before PTD Berth (again based on first line release time).
- Making it customer focused, with the KPI of the ship (idle time ship) as a starting point. One can create a dashboard for ATA Waiting Area versus ATA Berth on arrival. Example of a measured effect in one of the ports: total time from Waiting Area to Berth was reduced from 7.50 to 1.58 hours. The optimal time is 1.30 hours.

## Implementation with nautical service providers

The organization of nautical service providers may be different per port:

- Port planner planning all nautical services.
- Port planner oversees the safe use of the public water ways, and all nautical services have their own planning.
- Port planner oversees the safe use of the public water ways and plans a part of the nautical services, and the other part has its own planning.

Regardless the relation between port planner and nautical service providers, it makes sense that when all nautical services need to be at the same ship at the same time, that also the capacity requirements are aligned. However, in many ports the capacity requirements are not regulated in the same regulation or by the same authority:

- Pilots may have a national capacity requirement.

- Linemen may have a local capacity requirement.
- Tugs may have no capacity requirement, or e.g., a concession.

The alignment between these requirements is important because if not aligned, this can result in overall inefficiencies where pilot and linesmen may be available, but e.g., tugs are not.

Acts of God as a reason for not facilitating berth planning should be taken into account, as these conditions are beyond the control of nautical service providers, e.g.:

- Storms: above a pre-defined wind speed limit there are more tugboats needed given the average capacity of bow and/or stern thrusters. Furthermore, the pilots need much more time if the significant wave height is increasing.
- Period after the end of any blockage, e.g., end of a storm or visibility arrangement, till all waiting lists have been cleared.
- Any unforeseen calamities.
- Any foreseen blockages, e.g., special transport or construction.
- During any peak demands – e.g., if the number of orders for nautical services exceeds a certain threshold x per hour.

## Avoiding knock-on effects

The delay of one ship may cause a knock-on effect on other ships. It compounds a delay if they use the same tugboat or other services. The choice for such a scheme is based on:

- Nowadays, if a tugboat has been ordered, it is in many ports contractually impossible to sail away from the ship, even if it is clear that the ship will not leave for the time being.
- This not only influences the total availability of tugs at that moment, but also on other ships if the tug in question subsequently arrives too late for assistance.
- The tugboat company needs authorization from the local port authority to indicate to its customers that in certain situations canceling an order is justified.
- The impact of the domino effect on the planning of tugs is of course significant on the day itself, but may also still have an impact on the planning days later due to maintenance, rest hours etc.

## Persons with hands-on expertise

Enquiries should be directed to [Scherpenzeel.ehmc@harbourmaster.org](mailto:Scherpenzeel.ehmc@harbourmaster.org)

## 5.6. Operational data non-technical standards

This section outlines the non-technical standards (semantics). They're a critical starting point for defining the exchange of data between systems. They are provided to ensure consistent understanding and interpretation across different stakeholders. They are 100% based on existing IHO and IMO definitions.

### Link to the non-technical standards

The IMO Compendium [13] contains the IMO Reference Model and the IMO Data sets. The data sets contain a list of all data elements, their definitions and which data sets they are used in. The IMO Reference model also describes the relation between the data elements.

The IMO Compendium is basically a terminology register, and the exact definitions of this register have been copied in this chapter.

### Definitions – Date and time of Arrival – planned (PTA) Pilot Boarding Place (PBP)

#### Planned Time of Arrival (PTA)

IMO0235

Date and time of arrival – planned

**Definition:** the date and time the ship plans to arrive at a specific location, PTA.

**Format:** the type of the time is always ISO 8601 compliant: datetime, and time zone.

**Format:** the type of the time is always ISO 8601 compliant: date, time, and time zone.

#### Pilot Boarding Place (PBP) name

IMO0231

**Definition:** the name, number or description used to identify a Pilot boarding place.

A Pilot boarding place is the location offshore where a pilot may board a ship in preparation to piloting it through local waters.

#### Ship IMO number

IMO 0140

**Definition:** a ship identification number shown on its IMO ship's certificate.

#### Ship reporting system entry point, coded

IMO 0340

**Definition:** a code representing the point where the ship enters the system.

## Ship stay reference number

IMO 0153

**Definition:** a Reference number assigned by a port authority to the stay of a ship in the port

## Definitions – Date and time of departure – planned (PTD) Berth

### Planned Time of Departure (PTD)

IMO0237

Date and time of departure – planned

**Definition:** the date and time the ship plans to depart from a specific location.

**Format:** the type of the time is always ISO 8601 compliant: date, time, and time zone.

## Berth name

IMO0232

**Definition:** a name used to identify a berth. A berth is defined as a place, generally named or numbered, where a ship may moor or anchor.

## Ship IMO number

IMO 0140

**Definition:** the ship identification number shown on its IMO ship's certificate.

**Format:** n. 7 field, hence 7 long, containing only numeric characters.

## Ship reporting system entry port, coded

IMO 0340

**Definition:** a code representing the point where the ship enters the system.

**Format:** this must follow the UN/LOCODE, which is a pre-defined enumerated list of 5 long strings.

## Ship stay reference number

IMO 0153

**Definition:** a reference number assigned by a port authority to the stay of a ship in the port.

## 5.7. Operational data technical standards

This section outlines the technical standards. They are provided to facilitate seamless data exchange between computer systems. This includes specifications for the APIs and other digital interfaces that support automated data sharing. They can be built on many different formats (e.g., JSON, XML, html, etc.) – these are just languages, all different kinds of messages can be written in these languages if they are conformant with non-technical standards.

### Link to the technical standards

The authentication for the API can be implemented using either an API Subscription Key or OAuth 2.0. For operational data, which can be more sensitive than nautical data, it is recommended to implement OAuth 2.0.

The operational data API is compatible with the standard for the supply chain, ISO 19987.

All names in the API have been harmonized with the IMO Compendium and following the naming conventions (camelCase). However, long field names need to be omitted to avoid larger response, but they should also not be too short to allow intuitive recognition with the original definition.

Therefore, e.g., “date and time of arrival – planned” has been shortened to “dateTimeArrivalPlanned”, indicating that it contains date and time, and it concerns a Planned Arrival Time – in line with the definition.

### Port Arrival API response

```
{
  "shipIMONumber": "9123456",
  "shipStayReferenceNumber": "abc123",
  "shipReportingSystemEntryPortCode": "NLRTM",
  "dateTimeArrivalPlanned" {
    "pilotBoardingPlaceName": "MC",
    "plannedTimeOfArrival": 2025-10-17T07:20:50.52Z
  }
}
```

### Port Departure API response

```
{
  "shipIMONumber": "9123456",
  "shipStayReferenceNumber": "abc123",
  "shipReportingSystemEntryPortCode": "NLRTM",
  "dateTimeDeparturePlanned" {
    "berthName": "DS QUAY",
    "plannedTimeOfDeparture": 2025-10-21T17:20:50.52Z
  }
}
```

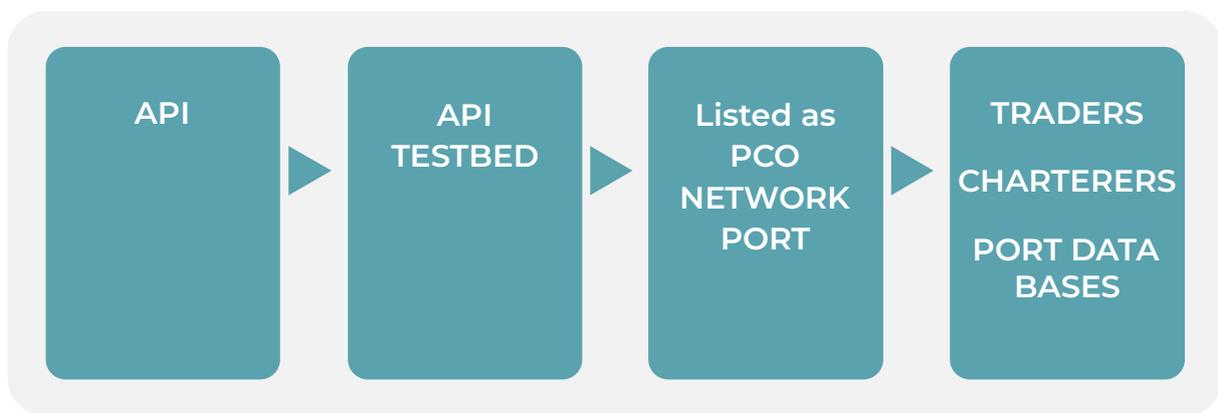
## 6. NEXT STEP AFTER REALIZATION OF APIS

### 6.1. General

Many ports have asked “how do I become part of the network of ports”?

Making this possible the International Hydrographic Organization has offered to host a GitHub with an API test bed for nautical and operational data from April 1<sup>st</sup>, 2026 till April 1<sup>st</sup>, 2031, based on a limited number of ports and the current scope of data.

### 6.2. API testbed procedure



- 1) The API of the port is ready to go
- 2) The API of the port is tested in the API testbed if it meets all the standards and criteria
- 3) If the API has been tested and approved, the relevant port will be listed as a PCO Network Port
- 4) Ship charterers, ship operators and all other actors in the business process have access to the same data at the same moment for Nautical and/or operational data

For data users there will be a demo API to ensure that the API of the data user can connect to the API of the data owner.

# REFERENCES

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- [1] IMO FAL49/INF.6; Guidelines For Harmonized Communication And Electronic Exchange of Nautical Data For Port Calls;  
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# APPENDIX 1 – Standards for areas

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## Link to the standards

Meeting of Nautical Information Provision Working Group 16/09/25 – to be published by IHO in Concept Register. Definitions are an exact copy of the papers for this meeting.

CHECK IHO Register

## Sea Passage

The portion of the voyage that takes place in open waters, beyond waiting areas at both ends.

## Port passage Planning Area (PPA)

Part of the Sea Passage as designated by the relevant port authority for the purpose of becoming an “Arrived Ship” for tendering Notice Of Readiness while the ship is still underway. The area may be outside the legal, fiscal, or administrative area of the port, but it must be clear that ships can sail with optimized speed without jeopardizing their place in the planning of the Port Passage and/or berth

## Waiting Area (WA)

Locations or berths as designated by the relevant port authority for the purpose of becoming an “Arrived Ship” for tendering Notice of Readiness. The area may be outside the legal, fiscal, or administrative area of the port, but it must be clear that ships are ordered to wait in this area for their turn.

## Port-passage

Passage in a port between waiting area and berth or inner port passage between berth A and berth B

## Berth

A place, generally named or numbered, where a ship may moor or anchor.



## **APPENDIX 2 – Examples for notices of intended use**

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“While the XXXX has made all reasonable efforts to ensure the data supplied is accurate, it should be appreciated that the data may not always be complete, up to date or positioned to modern surveying standards and therefore no warranty can be given as to its accuracy. The mariner must be the final judge of the reliance they place on the information given, bearing in mind their particular circumstances, the needs of safe and prudent navigation, local pilotage guidance and the judicious use of available navigational aids.”

## APPENDIX 3 – Examples for data sharing formalization

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### Example 1 – National port act combined with local port regulation

**National port act:**

“The Authority may, with the approval of the Minister, by notice in the xxxx, make rules for the control and management of ports and the approaches thereto and for the maintenance of safety, security and good order in ports, in particular regarding the manner in which control of a port must be exercised and the grounds of the information which has to be furnished to the Authority by port users in relation to their activities within ports.”

**Local port regulation referring to the national port act:**

“Port Rules: 164. Information to be furnished by port users. Despite the provisions of these rules, the Authority may request information from users of the port in relation to any of their activities within port limits and that information must be furnished to the Authority when requested.”

## Example 2 – Covenant between port authority and terminal

### Covenant between port authority and terminal

#### Parties

- Port xxxx, with its registered office in xxxx at xxxx, (hereinafter: Port) and as such legally represented by the Chief Operating Officer;
- Harbour Master of the port, employed by the port of xxx, established in xxxx with address at xxxx, (hereinafter: the Harbour Master);
- xxxx Terminal, statutorily established in xxxx with address at xxxx, and as such legally represented by her <function xxxx > <name xxxx > hereinafter: the Terminal)

The port, the Harbour Master and the Terminal, hereinafter jointly referred to as: Parties and each individually as: Party,

#### Whereas:

- Safety within the Port and Industrial Complex is of great importance to the companies established in the port and to the reputation of the port as a whole;
- Parties have the ambition to structurally increase the level of safety, each based on their individual responsibility;
- The port is responsible for, among other things, strengthening the competitive position of the port and attracting port-related business activities;
- The Harbour Master is responsible for, among other things, the safe and smooth flow and handling of shipping traffic and for guiding shipping in the port;
- The parties recognize that berth planning is the basis for port planning;
- Parties in various consultation forms and working groups have discussed the possibilities of improving berth planning and port planning;
- Parties need to record in writing in this covenant the agreements regarding data sharing with regard to berth planning within the port (hereinafter: Covenant);
- Signing this Agreement does not change the powers, responsibilities and authority relationships for the Parties as they arise from legislation and regulations,

#### Agree as follows:

Objective and organizational form of the collaboration

- The objective of the Parties is to improve berth and port planning by coordinating port and berth data.

**To achieve this objective, the Parties agree as follows:**

- It is necessary that the Terminal manager reports the following to the shipping agent via the Port Community System prior to the arrival of a specific seagoing ship at a berth of the Terminal:
  - The precise location where that seagoing ship is to moor;
  - From what time the berth is available for that seagoing ship, or in other words, what time the first rope can be tied up;
  - On which side the seagoing ship should moor at the berth (Starboard, Port Side, No Preference)

The shipping agent will then pass this information on to the Harbour Master.

- It is necessary that the Terminal manager reports the following to the shipping agent via the Port Community System before the departure of a seagoing ship from a berth of the Terminal:
  - The time at which the cargo handling operations by the Terminal in respect of that seagoing ship are stopped so that the seagoing ship can safely depart, i.e. at what time the first hawser can be cast off;

The shipping agent will then pass this information on to the Harbour Master.

- Changes to the reported data and changes of 30 minutes or more in the previously reported time stamps will be immediately communicated to the ship's agent by the Terminal manager via the Port Community System. The ship's agent will then pass this information on to the Harbour Master.
- Changes in the Port Planning that impact the arrival or departure time of a seagoing ship from the Terminal berth will be shared by the Harbour Master with the Terminal manager via the Port Community System and the ship's agent. This means that changes of more than 30 minutes will be communicated immediately.
- The data made available to each other by the Parties in the context of the objective will be used exclusively for the objective and will be considered and treated as confidential data to ensure that the privacy and commercial interests of the Parties are protected. In concrete terms, this means that the port will not share expected arrival dates and times with parties that do not directly participate in the nautical process before the ship has reached the pilot station.
- It is expressly prohibited to use the received data for other commercial purposes, including but not limited to sale and licensing, or any other use not directly related to improving port planning.

**Division of roles and responsibilities**

- The Terminal is the data holder of the berth planning.
- The Harbour Master is the data holder of the port planning.
- Shipping agent: the local representative of the ship; is authorized by the Harbour Master to make the legally required notifications on behalf of the ship he/she represents as prescribed in the Shipping Reporting Formalities and Data Processing Decree.
- Port Community System: the public platform designated by the Harbour Master as a reporting address.

**Governance**

- During the term of the Covenant, an evaluation will be carried out annually around May by the signatories or their alternates.

## Entry into force, amendment and termination

- This Agreement provides substance to the improvement of berth planning and port planning.
- The Agreement shall enter into force at the time the Agreement has been validly signed by all Parties and shall be concluded for a period of five years.
- Parties acknowledge a collective responsibility with regard to the continuity of sharing of berth planning and port planning.
- Each Party undertakes to enter into discussions with the other Parties at least 3 months prior to the termination of its (further) data contribution. If these discussions do not result in a data contribution arrangement that is satisfactory to all Parties, the Parties each have the right to terminate the Agreement for the part that concerns them. The separate parts are (1) the berth planning and (2) the port planning.
- This Agreement may only be amended in writing with the consent of all Parties.
- Parties will make further agreements on further (public) communication regarding amendment or termination of the Covenant by one or more parties. Parties will strive for uniform communication in this regard.
- The Parties shall also impose the obligations stated in this Agreement, to the extent applicable to them, on personnel and third parties involved by them in the implementation of the Agreement.
- The Parties shall not be permitted to assign their rights and obligations under this Agreement to a third party without the prior written consent of the other Parties. Such consent shall not be withheld without reasonable grounds.

## Confidentiality

- Communication to third parties about the cooperation referred to in this Agreement (including any termination thereof) will only take place in consultation with all Parties. Communication to third parties includes, among other things: issuing press releases, listings on websites, publications in trade journals and other forms of information provision.

## Applicable law

- This Agreement is governed by XXXX law.

## Definitions

- In this Agreement, the following terms shall have the meanings indicated:
  - Berth planning: the planning for the use of the Terminal's berths, which is drawn up by the Terminal.
  - Port planning: the planning of the use of the waterways in the port from a pilot station or similar location to the berth and vice versa, which is drawn up by the Harbour Master.

### Port Authority

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

### Terminal

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

# APPENDIX 4 – Examples for industry vs IMO standards

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## General

Some industry standards may be industry specific, e.g., only used in tanker operations, and not in passenger ship operations.

Some industry standards may be port specific, e.g., with the local language, or specific practices in the port.

This Appendix explains a few of these industry standards and how they relate to IMO standards.

## ETA – General

Estimated Time of Arrival is, as it says, an estimated time from the captain based on Distance To Go and Speed Over Ground of the individual ship. Not related to planning of other ships at a berth or pilot boarding place – which involves multiple other stake holders. Therefore, the request to arrive at these locations was defined separately (requested times) and the confirmation to those requests (planned times).

## ETB → RTA Berth

One of the most used time stamps is ETB: Estimated Time Berth. Whether this is an Arrival or Departure time is not specified – normally the ETB is used as Arrival time, meaning PTA Berth.

## Nomination → RTA Berth

Often used in tramp shipping, meaning RTA Berth.

## Scheduled Time of Berth → PTA Berth

Often used in the tanker segment, meaning PTA Berth.

## Estimated Time of Loading (ETL) → PTA Berth

Often used in the bulk segment, meaning PTA Berth.

## Scheduled Unberthing Time → ETD Berth

Often used in the tanker segment, meaning ETD Berth.

## Ship Called In Time → PTA Berth

Often used in the tanker segment, meaning PTA Berth.

# PORT CALL OPTIMIZATION (PCO) GUIDE

Guide for Harmonized Communication  
and Electronic Exchange of Nautical  
and Operational Data for Port Calls

Concept: Version 1 ©



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