IoS-OP: INITIATIVES FOR SHIP OPERATION DATA COLLECTION, DISTRIBUTION, AND UTILIZATION

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SUMMARY

This paper introduces the legal arrangements and activities for data sharing within the IoS-OP implemented by ShipDC for the promotion of ship IoT data collection, distribution and utilization.

1.   INTRODUCTION

IoS-OP (Internet of Ships Open Platform) is a framework that is composed of a data platform which has mechanisms for data distribution according to common rules that are agreed to within the industry and for onshore storage and distribution of that data, to realise the smooth, fair and equitable distribution of ship operation data. Not only will utilizing this framework make it easy to use data but it will also enable data sharing with a high level of transparency without incurring any disadvantages.

Ship Data Center (hereinafter, "ShipDC") was established in 2015 as a 100% wholly-owned subsidiary of Nippon Kaiji Kyokai (NK) to promote the digitization of the industry and provide a space for co-creation. ShipDC provides the data platform as a space for fair and equitable data sharing and as an ecosystem by operating this framework together with private companies. In 2018, the IoS-OP Consortium was launched, and the data distribution business was started through IoS-OP.

This paper describes the legal issues and the activities undertaken through private initiatives for IoS-OP data sharing.

2.   IoS-OP

As shown in Figure 1, IoS-OP designates the common rules established for data handling (software side) and the data center (hardware side), which is the onshore storage vault for the data sent from the ships, as the cooperative domain, and provides an environment in which the members can focus on the creation of new forms of innovation which is the resulting competitive domain. In addition, IoS-OP is a framework that increases opportunities for data utilization not only in the maritime industry but also outside of the industry, and can contribute to the safe operation and efficiency of ships as well as ESG and SDGs. These activities are being implemented through the IoS-OP Consortium which is the ShipDC members' organization.
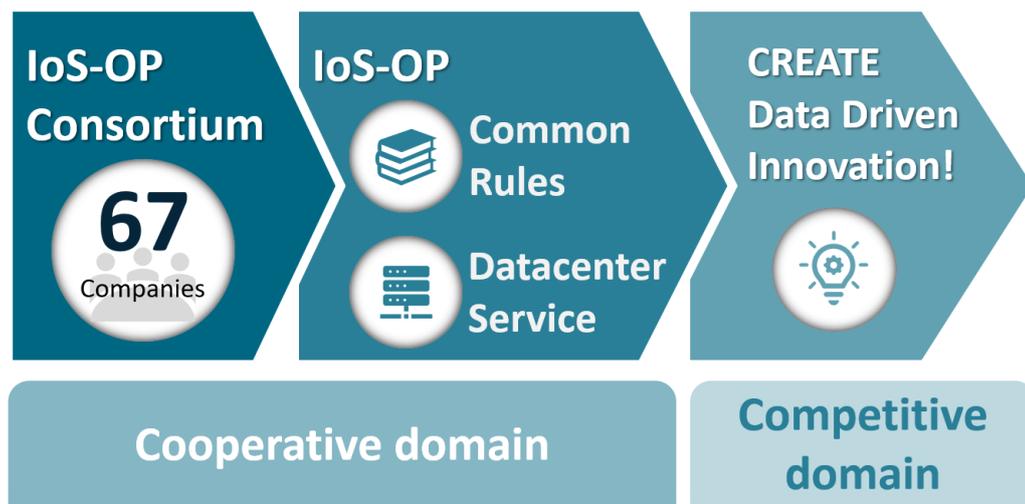

Figure 1. Cooperative and competitive domains

2.1   IoS-OP CONSORTIUM

The IoS-OP Consortium was launched in April 2018 and has mainly worked on arranging the legal rights regarding data utilization and application, examining the utilization and application needs, and promotion, etc. Recently, the Consortium has shifted to solving issues that have become apparent in the actual business usage and activities to promote data utilization and application.

At the time it was launched, the IoS-OP Consortium consisted of 44 member companies, and as of the end of August 2022 that number has expanded to 67 companies. The activities of the IoS-OP Consortium are primarily carried out within the Japanese maritime cluster, but because there are no established restrictions on nationality or business type as requirements for participation, companies outside of Japan and IT-related companies outside of the industry are also participating and expanding their activities worldwide.

The IoS-OP Consortium is structured as follows with the promotion of data distribution, legal reviews and other activities being continuously carried out through private initiatives.

- General meeting which revises terms and conditions and approves business plans and budget plans, etc.
- Steering Committee which carries out the operation principles of the IoS-OP Consortium, matters concerning the operation of the Sub-committee, establishment and operation of the Working Groups (WG), election of leaders, and the amendments or abolition of the IoS-OP Terms of Use, etc.
- Sub-committee which discusses and proposes the operation principles and makes adjustments between each WG, etc.
- Rule Development & Data Governance WG、Solution WG、Business Promotion WG、Human Resources Development WG

2.2   WORKING GROUPS

The IoS-OP Consortium not only consults and discusses so that the basic rules within the actual data distribution are in accordance with the operation but also conducts a diverse range of activities such as planning, hosting seminars and human resource development to promote data utilization and application. These activities are divided among the following four WGs.

- Rule Development & Data Governance WG
  Debates decisions regarding new issues as needed such as the discussion and formulation of rules regarding data utilization and application within IoS-OP and legal arrangements concerning data transactions, etc.
- Solution WG
  Extracts and discusses issues within solutions utilizing IoS-OP, formulates security guidelines to ensure data confidentiality and holds discussions to solve issues from the data users' perspective. Recently, this WG has held review meetings concerning data quality.
- Business Promotion WG
  Plans and implements various seminars for the promotion of data utilization and application as well as the continuous implementation of IoS-OP public relations and dissemination activities. Seminars are held not only within Japan but also Singapore and Taiwan, etc.
- Human Resources Development WG
  Plans and implements human resource development within the industry such as ideathons and operational performance analysis study meetings.

3.   COMMON RULES

The common rules regarding data handling (IoS-OP Terms of Use) were repeatedly discussed and formulated within the IoS-OP promotion conference, which is made up of 55 companies from the maritime industry, with a focus on achieving secure data distribution without the stakeholders being placed at a disadvantage. In accordance with the IoS-OP Terms of Use, which are the common rules, the IoS-OP Consortium aims for a data-driven world and provides a secure, safe, fair and equitable space for data sharing.

In formulating the common rules, data ownership, the roles of stakeholders and the disadvantages of data sharing were discussed and organized from both the data providers' and users' perspectives so that neither would be placed at a disadvantage.

3.1   DATA OWNERSHIP

Defining data ownership is the key to controlling data access. In the IoS-OP, data ownership is defined as the authority to utilize data on an agreement basis, and the platform user (PU) is the entity who has the authority to utilize data on the IoS-OP.

For the PU to have the authority to utilize data and provide the data to the IoS-OP, it must establish who, between the stakeholders involved in the data generation and collection process (e.g., the data generator and data collector), has the authority for the utilization of data.

It is often the case that the data collector become PU, however, any entity such as a ship manager, shipyard etc. can become PU.

In general, the data generator is considered to be the shipowner, therefore, if stakeholders other than the shipowner (in many cases, the data collector) wants to become the PU, then consultation and arrangement with the shipowner is required for the establishment of the authority to utilize data, which would be determined based on the contribution to the generation and collection of the data as below:

- Who will own shipboard data collecting device
- Who will bear cost for installation of shipboard data collecting device and/or satellite data communication
- Who will bear cost for maintenance work of data collecting and /or device
- Who is contractor for the commission of PP
- Who has the responsibility of data management
- Who has the responsibility of security management of data

3.2   DEFINING THE ROLES OF STAKEHOLDERS

After clarifying the rights of stakeholders from a legal perspective, it was necessary to clarify the role of each stakeholder according to the data flow from data generation to usage. Therefore, as shown in Figure 2, using the data flow as the basis, the data usage manager (PU: Platform User), shipboard data server seller (PP: Platform Provider), onshore solution provider (SP: Solution Provider), data user for the purpose of contributing to ship operation (SU: Solution User), and the data user for the purpose of improving their products (DB: Data Buyer) were defined.
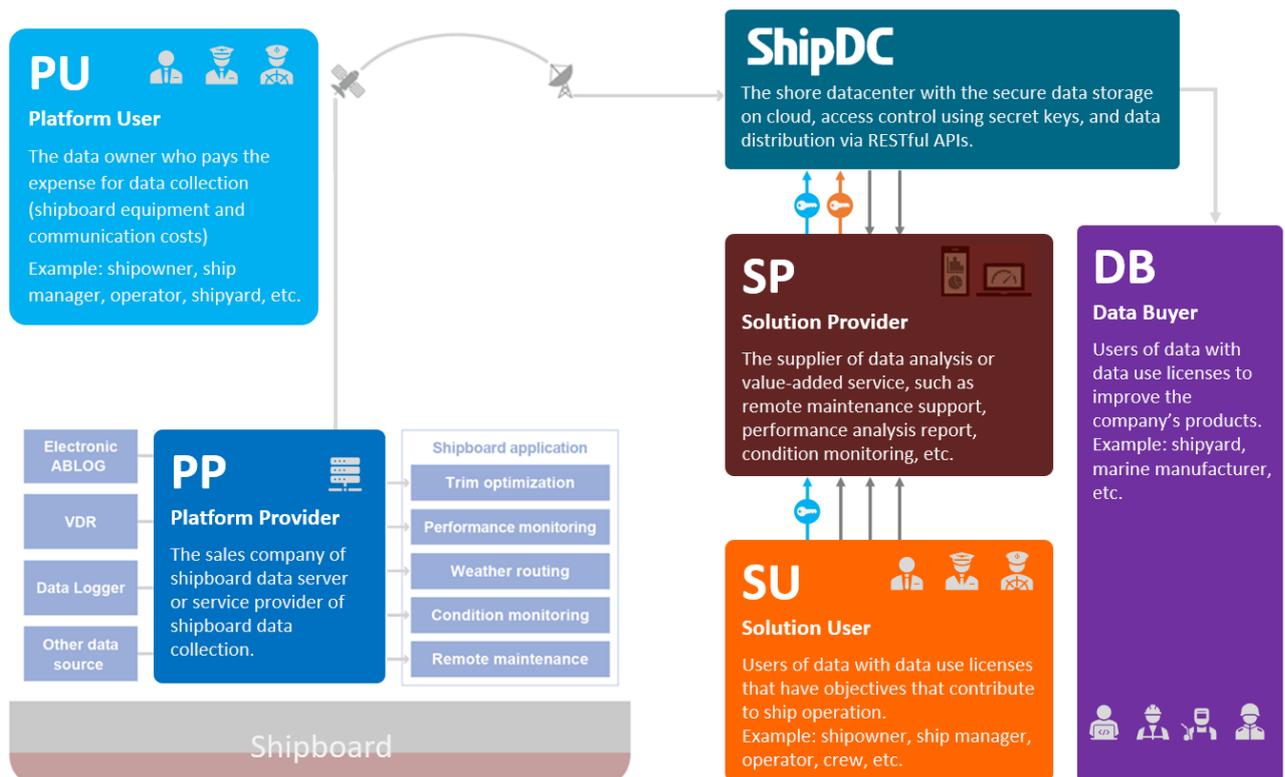

Figure 2. Roles of stakeholders

3.3   MANAGING DATA SHARING DISADVANTAGES

To ensure that the parties who store the data, parties that use the data or businesses that are involved in data collection and distribution can securely share the data, the IoS-OP Terms of Use (common rules) prohibit the sharing of data with

competing companies as shown in Table 1. This means that data cannot be freely shared even by a data manager and it is based on the belief that data should be shared based on public policy.

Furthermore, in the event that new issues regarding data sharing arise, they will be debated in the IoS-OP Consortium as needed.

	Business operator attributes	Data Buyer	Solution User
Companies pertaining to the ship	Shipowner and ship manager	May purchase	May be permitted
	Charterer	May purchase	May be permitted
	Ship building yard	May purchase	Not applicable
	Manufacturers of the machinery, equipment, and other onboard devices	May purchase	Not applicable
	Insurance company	May purchase	Not applicable
Competitors of the companies above	Shipowner and ship manager	Not available	Not available
	Charterer	Not available	Not available
	Shipyard	Not available	Not available
	Manufacturers of the machinery, equipment, and other onboard device	Not available	Not available
	Insurance company	Not available	Not available
Third parties	Classification society, research institute, analysis provider, etc.	May purchase	Not available
Where not appliable to the above AND where ShipDC could find that it will not harm the profits for stakeholders based on the advice and reports from Rule Development & Data Governance WG.		May purchase (Conditional)	Not available

Table 1. Data access matrix

3.4   REDUCING THE BURDEN OF CONTRACT WORK

By defining the stakeholders, each of their relations of right and covenants were clarified, and as shown in Figure 3, their required terms were defined. These terms are one of the unique features of IoS-OP. As the IoS-OP users agree to a common set of terms, it eliminates the complexity of individual contracts signed by each user while also providing a space for transparent data provision and usage.
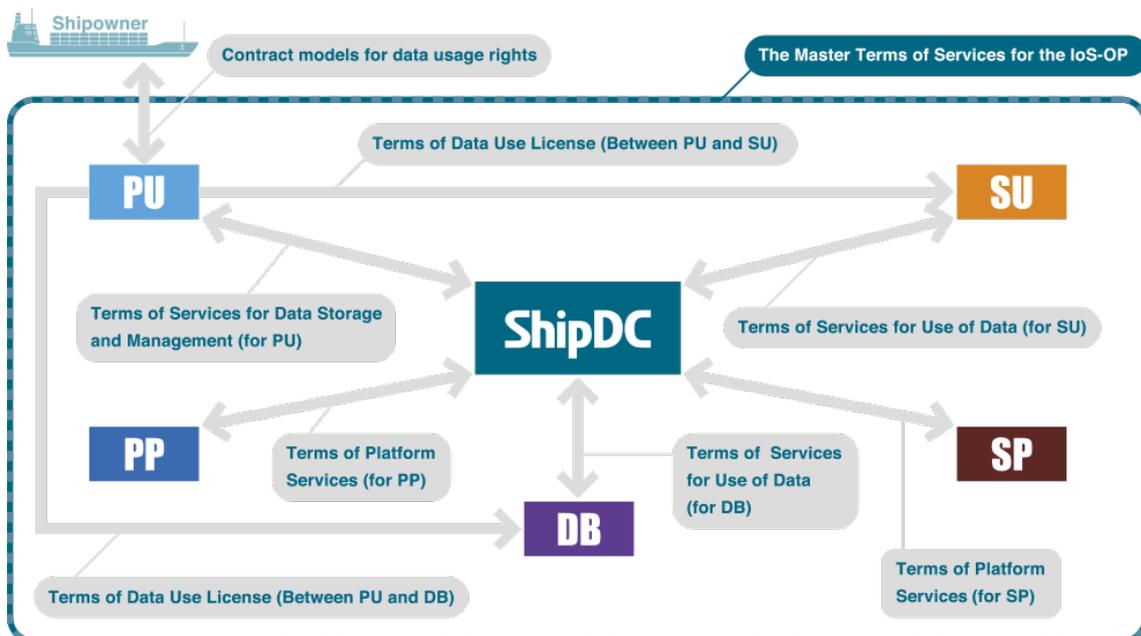

Figure 3. IoS-OP Rules

4. ShipDC AS SHORE DATA PLATFORMER

ShipDC provides not only onshore data storage but also functions for data access management, etc. so as to be able to realise data distribution according to the IoS-OP terms of use. These functions also allow specification of the access range down to the levels of ship, data item and data granularity. Moreover, when it comes to timeseries data or data with timestamps, ShipDC can receive and store any kind of data and provides methods for accessing and downloading from the web system and automatically retrieving data through a Web-API.

Furthermore, ShipDC is compliant with ISO 19848, which means that data stored onshore can be used by either the data channel name used on the ship or a standard name that is compliant with ISO 19848. This reduces the complexity of mapping due to differences in the data names for each ship during data usage.

4.1 ShipDC FUNCTION

As shown in Figure 4, the ShipDC data platform is equipped not only with data storage but also data access controls, data monitoring functions and API-based data delivery functions. In addition, data can be sent via mail attachment and API Post.

In the data access controls, the data usage manager (PU: Platform User) can edit the access settings (vessel, data items, granularity, usage period) of the data user (SU: Solution User), and there is a mechanism for controlling the range of data the SU can retrieve through a data key that is issued at that time. With the data monitoring functions, you can monitor lack of data, exceeded thresholds, and data non-delivery, etc.
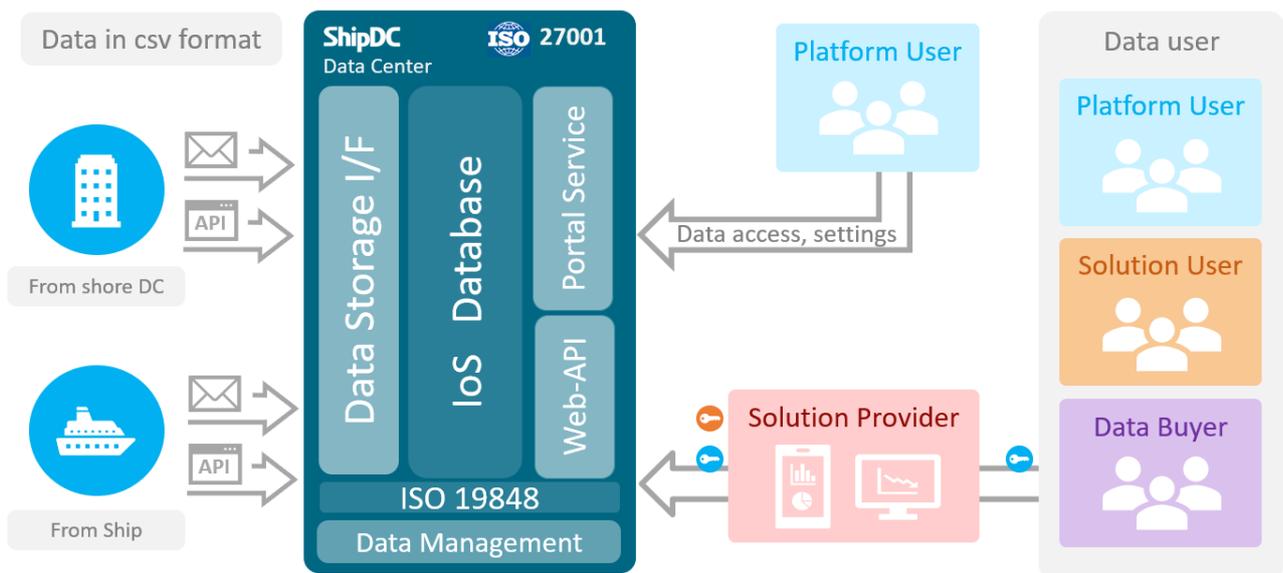

Figure 4. Data flow

4.2 ISO19847 AND ISO19848

The Smart Ship Application Platform Project (SSAP) under the Japan Ship Machinery and Equipment Association (JSMEA) formulated international standards for related technologies to make it easy to develop and introduce onboard and ship-to-shore applications.

Because the ShipDC data platform is compliant with ISO 19848 and the shipboard data servers (PP) are in some cases compliant with ISO 19847, the following provides a simple explanation of each standard.

- ISO19847: Shipboard data servers to share field data at sea
  Regulates the functional and performance requirements for the shipboard data server that collects data from the onboard devices and systems and is used to share the data safely and efficiently. It is primarily composed of the data input/output functional requirements and regulates the data storage functions, input/output interface functions, condition monitoring functions, data backup and restore functions, security requirements, and condition reporting functions.
- ISO19848: Standard data for shipboard machinery and equipment
  It was formulated to improve the connectivity convenience between devices and systems by standardizing the various types of data exchanged between onboard devices on the ships or between systems. The SSAP has created a

list of standard names, dictionary, and data catalogue based on this standard and made them available on the SSAP web site.

5. CONCLUSIONS

The data ownership approach is intended to achieve an orderly data distribution. We believe that making this approach common throughout the world will accelerate the shift to a data-driven world without harming the interests of all stakeholders involved in data distribution. We hope that through these activities, we can help pursue safe ship operation and contribute to the environment while supporting everyone's business activities.

6. AUTHORS BIOGRAPHY

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7. ACKNOWLEDGEMENT