Collaboration with NYK Line in the Maritime Industry

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Abstract

The maritime industry (shipping companies, shipyards, marine equipment manufacturers, etc.) in Japan and the rest of the world is going through a major transformation. The issues to be addressed include further strengthening environmental regulations, reforming an industry structure that is likely to be affected by global economic trends, building evolved ships with a view to future autonomous navigation, and finding a solution to the increasing shortage of human resources such as captains and sailors. The NTT Group aims to support the maritime industry in addressing these issues and is therefore applying its information and communication technology expertise cultivated in the telecommunications business to the maritime industry. In this article, maritime industry trends and specific efforts of the NTT Group in response to those trends are introduced, and future directions are presented.

Keywords: edge computing, IoT platform, shipping

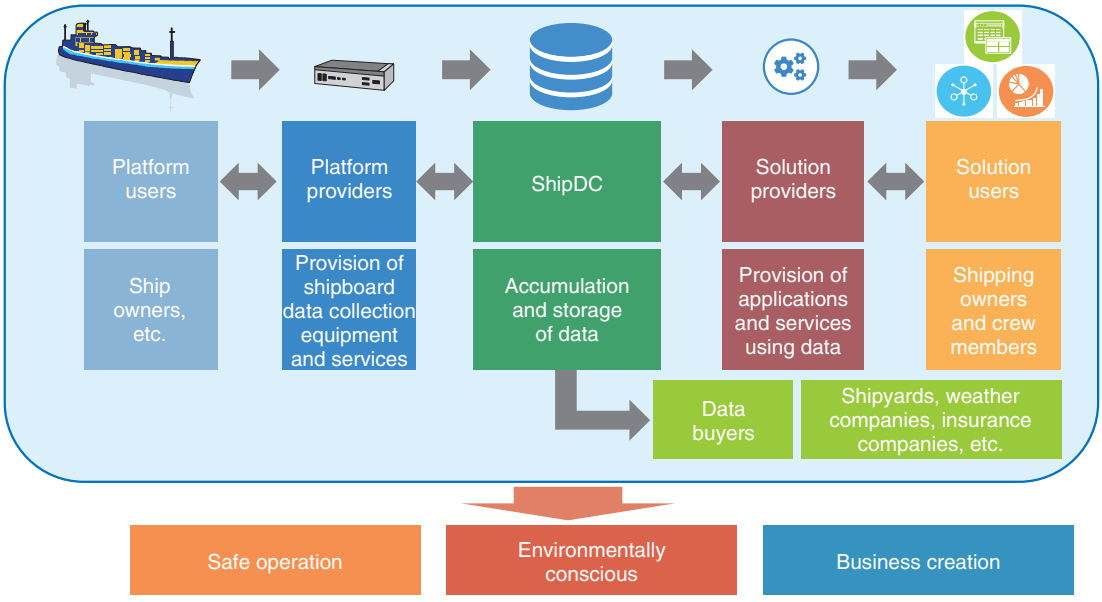
1. Issues concerning the maritime industry and necessity of digitization

Efforts to introduce the Internet of Things (IoT) in the Japanese maritime industry have mainly been promoted by the Internet of Ships Open Platform (IoS-OP), a consortium operated by the Ship Data Center (ShipDC) (a subsidiary of Nippon Kaiji Kyokai, known as ClassNK [1]), and in which 46 companies including NYK Line and NTT are participating. In addition to shipping companies, shipyards, and marine equipment manufacturers, information and communication technology (ICT) companies such as NTT are also participating in this consortium, and we are developing rules and contracts for sharing and utilizing ship data within the maritime industry. What is unique about this approach is that it is not manufacturer driven; instead, it is an industry-wide mechanism involving user companies such as shipping. ClassNK, the general incorporated foundation, handles the function of sharing data from datacenters, and by doing so, it plays the role of coordinating various interests in the ownership and utilization of data. This effort to promote data distribution by ClassNK is slightly different from the approach to IoT taken by other industries (**Fig. 1**).

One reason that Japan's maritime industry has built a platform called IoS-OP and is hastening data utilization is to meet the goals of the strict environmental regulations imposed on the maritime industry. At the 2018 72nd meeting of the Marine Environment Protection Committee (MEPC 72) of the International Maritime Organization (IMO), the "Initial IMO Strategy on Reduction of GHG Emissions from Ships" was adopted, which comprehensively establishes a greenhouse gas (GHG) emission-reduction target for international shipping and the measures to meet that target [2].

This strategy was the first in the world, in a single sector, to commit to the worldwide goal of zero emissions of GHG during this century. This is a long-term policy that sets out—through further promotion of energy conservation technology, implementation of economic incentive methods, and other measures—to improve fuel efficiency of international shipping as a whole by 40% by 2030 compared to 2008, to halve GHG emissions by 2050 compared to 2008, and ultimately, to meet the very high goal of zero emissions of GHGs during the 21st century.

In the maritime industry, although efforts to reduce



Source: Created using materials from ShipDC

Fig. 1. Role of IoS-OP.

the fuel costs of ships are being made, crude oil prices are on the rise, and the burden of fuel costs is expected to be further increased by the regulation of SOx (sulfur oxide) emissions taking effect in 2020. Consequently, the momentum behind improving ship operations and design is growing. In particular there is still considered to be room for improvement regarding ship design. To that end, it is essential to collect, share, and utilize actual data concerning ship operations by digitization such as IoT and artificial intelligence.

The governments of Europe and China have recently strengthened efforts toward environmental regulation. As for Japan, it is important to lead the world in developing technologies as well as promoting standardization and rule making.

2. The challenge towards digitization

At NYK Line, differentiation by technological capabilities has been identified as one of the themes in the medium-term management plan "More Than Shipping 2018—Stage 2, leveraged by creative solutions—" for fiscal years 2014 to 2018. They have promoted initiatives to create new business and to solve problems by harnessing their technological capabilities, front-line capabilities, and creativity.

Regarding those initiatives, NYK Line aims to further raise the level of safety and environmental responsibility efforts—which are essential from the viewpoint of shipping companies—and also focus on innovation by using the latest ICT such as IoT and big data. They are therefore advancing research on ways to achieve optimum operation through data utilization, fault prediction and prevention of ship equipment, and development of technologies for future autonomous-navigation vessels. One such initiative involves the development of a ship information management system (SIMS), which is a performance management system for monitoring oceangoing ship data in detail, such as the operational status and equipment status, and sharing information between ship and shore.

3. Joint experiment on utilizing edge computing

The use of edge computing technology (such as software distribution technology and data-exchange platform technology) and the know-how of the NTT laboratories in the next-generation SIMS of the NYK Group will make it possible to promptly utilize various data gathered onboard via various applications as well as to stably and efficiently share data, information, and applications between onboard and land offices. In this manner, we are promoting initiatives such as more advanced ship operations and maintenance

management.

In a joint experiment utilizing an experimental SIMS installed on an oceangoing ship, we successfully demonstrated a next-generation onboard IoT platform with a mechanism for distributing and managing the installation of new applications and updates of existing applications to the SIMS from land [3]. We are currently developing this platform with the aim of its commercialization.

4. Future development

We successfully demonstrated the next-generation onboard IoT platform as the infrastructure for digitization of ships. Going forward, we plan to utilize NTT's technology and expertise in many ways such as developing various applications using the platform, applying sensing technology for an entire ship, and implementing security measures for complete digitization, including encryption of data distribution on IoS-OP. We have thereby taken up the challenge of globally supporting the NYK Group and the entire maritime industry. As a final note, in pursuit of safe and efficient operation of ships, environmental efforts, and strengthening international competitiveness, we should all pay attention to creating innovation in the maritime industry.

References

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Trademark notes

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He received a B.S. from Kwansei Gakuin University, Osaka, in 1996 and an MBA from University of Washington, USA, in 2007. After joining NTT in 1996, he was engaged in business development in a joint venture between NTT and an energy company for five years. He has also worked in service development in various fields including IoT networks, LPWA (low power wide area), and IP (Internet protocol) phone payment services.