INTERVIEW

HIDEYUKI ANDO,

Senior General Manager, Maritime Technology Division MTI (Monohakobi Technology Institute, NYK Group)

IoT platforms for shipping

Big Data and IoT (Internet of Things) have recently become important themes for the shipping industry. In the future it is foreseen the integrated management of IoT data taken from ship machineries and equipment will be used in a wide variety of ways such as to improve operational efficiency, safety operations, condition-based maintenance of machineries, classification surveys and inspection, and other purposes.
But to realise this, it is essential to cooperate right across the industry to have an industry common platform to share ship's IoT data.
In Japan, shipping companies, ship machinery manufacturers, classification society and service providers are cooperating to create an open platform through the Smart Ship Application Platform Project (SSAP) with a good support by government. This type of project is suitable for Japan, where a wide variety of businesses in the maritime industry are accumulated.
The chairman of the project is Hideyuki Ando, senior general manager at MTI, who talked about the road toward realising big data in shipping.

—Digitalisation becoming a major topic for shipping

In shipping, potential technical revolution areas are shifting from the Eco Ship to the Smart Ship and from the hardware to the software field.
A key element of the revolution is Information and Communication Technology (ICT). Throughout the maritime industries, researches and developments are taking place that analyse and utilize any types of data taken from ships with the aim of improving operational safety and efficiency.
ICT toolkits include a variety of fields such as IoT, satellite communications, data analysis, Apps, system integrations, automation and robotics.
In the industrial machinery fields that have taken the lead in this, for example in the wind turbine industry, the products are being developed with sensors and intelligent systems. It can prevent unexpected downtime, reduce maintenance costs and improve energy efficiency through their life cycle with condition monitoring, big data analysis and supports of service engineers.
IoT data collected from the real wind turbine are fed into a virtual wind turbine on computers. The actual conditions of each wind turbine can be reproduced on computers using IoT data and data analysis and simulation technologies. It represents the current status of each wind turbine and allows forecasting under various estimated scenarios.
As a result, a higher level of operational efficiency and safety becomes possible, and the remained useful life of each wind turbine and its component can be estimated. It is the thought that a similar way of thinking can be applicable in shipping.

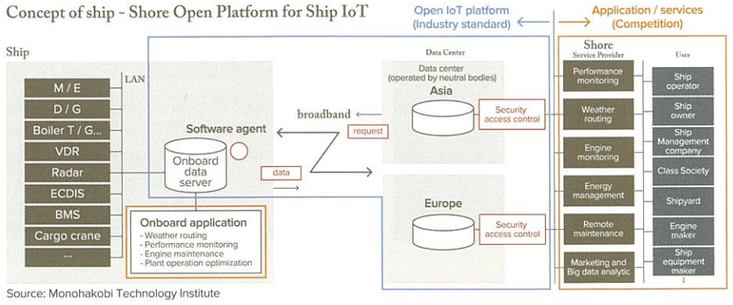
—What activities are being undertaken at the Japan Ship Machinery and Equipment Association (JSMEA)'s Smart Ship Application Platform (SSAP) project?

Ship and its component data had largely been kept within shipping companies so far. However, in the coming era of IoT, ship's data needs to be shared among related parties to realizing actual values of the data. SSAP project is conducting research on creating an open platform where ship related data are properly shared within the industry with the aim of safer and highly economical shipping industry.
In 2012 the SSAP project began as Joint Industry Project and its activities are followed by SSAP2 from 2015 to develop ISO standard and take the research further.
SSAP2 consists of 34 member companies and 10 observers, which include shipping companies, shipbuilders, ship's machinery and equipment suppliers.

—What is the ship and land based open platform the project is trying to achieve?

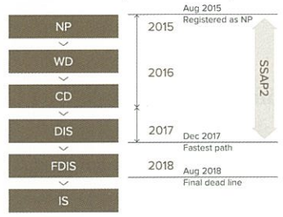
It is a platform that supports utilisation of IoT data and building services with strong security and proper access control. A shipboard data server accumulates sensor data from onboard machinery and equipment , the collected data are sent through satellite broad-band network and stored in a ship data Center managed by a classification society. Shipbuilders and machinery manufacturers who have access control keys can access their requiring data. Currently the project group is discussing such data ownership issue together with Ship Data Center as same as technical aspects. The group is also

Concept of ship - Shore Open Platform for Ship IoT



Source: Monohakobi Technology Institute

Process for ISO (ISO CD19847, ISO CD19848)



- ISO PWI 19847 / 19848 were accepted as NP in Aug 2015
- The first ISO / TC8 / SC6 / WG16 meeting was held in June 2016 in Tokyo
- 2 CDs will be distributed soon for comment and voting to the P-memders of ISO / TC8 /SC6

NP : New work item Proposal
WD : Working Draft
CD : Committee Draft
DIS : Draft International Standard
FDIS : Final Draft International Standard
IS : International Standard

Source: Monohakobi Technology Institute

promoting ISO standardization regarding requirements for ship IoT data collection server and naming rules about IoT data as ISO CD 19847 and ISO CD 19848.

—What are the remaining issues?

Cyber security will become very important. Up to now it was very unlikely happening that onboard systems are attacked from outside as the onboard systems are very closed and independent from outside.
But the cyber security risk will increase when ships are connected to shore via broadband network. For achieving cyber resilience of ships, risk management is necessary to provide sufficient barriers to block hazards, such as malicious attacks from outside network, and at the same time, it is important to prepare barriers to minimize damages caused by the cyber incidents.
In Japan, the Japan Ship Technology Research Association (JSTRA) established a study group about cyber security in the last year. Risk management of ship cyber security are currently studied and discussed.

Expected activities on ship IoT and open platform

Role	Activities on Ship IoT and open platform
Shipping	Ship owner and operator needs applications for energy saving, minimize downtime,safety transport and environmental conservation
Manufacturer	Remote diagnosis, preventive maintenance and Self diagnostics
Shipyard	Data analysis services for ship owners, life-cycle support and feedback to new design
Service provider	Fleet management system, big data analysis services, condition monitoring services and IoT platform
Academy	Research on big data analysis, numerical simulation methods and digital twin.Education and trainings.
Class society	Shore data center. Class inspection

Goverment... utilization for e-navigation and MRV

Source: Monohakobi Technology Institute

—What is the roadmap for the use of Big Data from now on?

Application, platform and regulation – we expect progresses in these three main areas.
As far as applications are concerned, Japanese government MLIT (Ministry of Land, Infrastructure, Transport and Tourism), is now supporting R&D called "i-Shipping", where digitalization in ship design, production and operation are promoted. Improving safety by IoT of ships are the key subjects in i-Shipping (operation), where wide variety of R&D projects of utilizing IoT for safety, such as navigational safety and autonomous ship, engine damage prevention, hull health monitoring and condition monitoring of cargo equipment, are carried by each R&D group.
Despite from i-Shipping projects, manufactures and class societies will promote condition-based maintenance of main engines and other auxiliary machineries. Ship owners will appreciate these technical services to reduce their maintenance costs.
Shipping companies and operators are looking at areas such as integrating IoT data with their business and operation systems. Optimisation, automation and simulations will be more and more used.
The use of AIS data will also increase.
As for platform, SSAP2 project will promote the ISO standardization. We expect the standardization will be registered in the end of 2017 in the earliest case or within 2018 at latest.
Also Ship Data Center, set up as Class NK subsidiary, have already started and we will see several trials of using Ship Data Center in 2017 and we expect its operation after the trial period.
As for regulation is concerned, cyber security guidelines from BIMCO and the International Maritime Organisations Maritime Safety Committee have been already placed in the last year. in Japan, the JSTRA committee on cyber security will continue to study until 2019, and we expect to see some direction about how to achieve cyber resilient ship.
The European Union will introduce a Monitoring, Reporting and Verification (MRV) system in 2018 and the IMO's global MRV system is scheduled to start in 2019. It might be also relating to ship IoT data and we expect Ship Data Center may also play a platform role.
In Europe and in some Asian countries, several technological development projects undergo as testbeds under IMO e-navigation strategic plan. The main target of e-navigation are regarding sea traffic management and many of these testbeds are considering ship-ship and ship-shore data-link as their basis. The e-navigation aims its operation in 2020 and we expect several new technologies will come into ship navigation and traffic management.

Profile of Hideyuki Ando (Doctor of Engineering)

Born in 1971 Hideyuki Ando graduated from the school of engineering at the University of Tokyo and worked in the shipbuilding industry. In April 2014 he became Senior General Manager of the Maritime Technology Division at Nippon Yusen Kaisha group company MTI. He is currently chairman of the SSAP2 project.