新スマートナビゲーション研究会の活動について

株式会社MTI

SSAP2:
Smart Ship Application Platform 2 Project

Japan Ship Machinery & Equipment Association

SSAP2 Project

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JSMEA Japan Ship Machinery and Equipment Association

Background

❖ Onboard and ashore IoT application services, which relies on ship onboard equipment data, have become prevalent.

❖ Weather routing

❖ Optimum trim

❖ Performance monitoring

❖ Engine monitoring

❖ Condition monitoring

❖ Power plant energy management

❖ Remote maintenance

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Smart Ship and SSAP

❖ The concept of Smart Ship is to utilize IoT application services to achieve optimum ship operation in terms of safety and energy efficiency

❖ The target of SSAP (SSAP & SSAP2) project is to support these IoT application services to access ship equipment data easily and enhance more application services development

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IoT (Internet of Things)
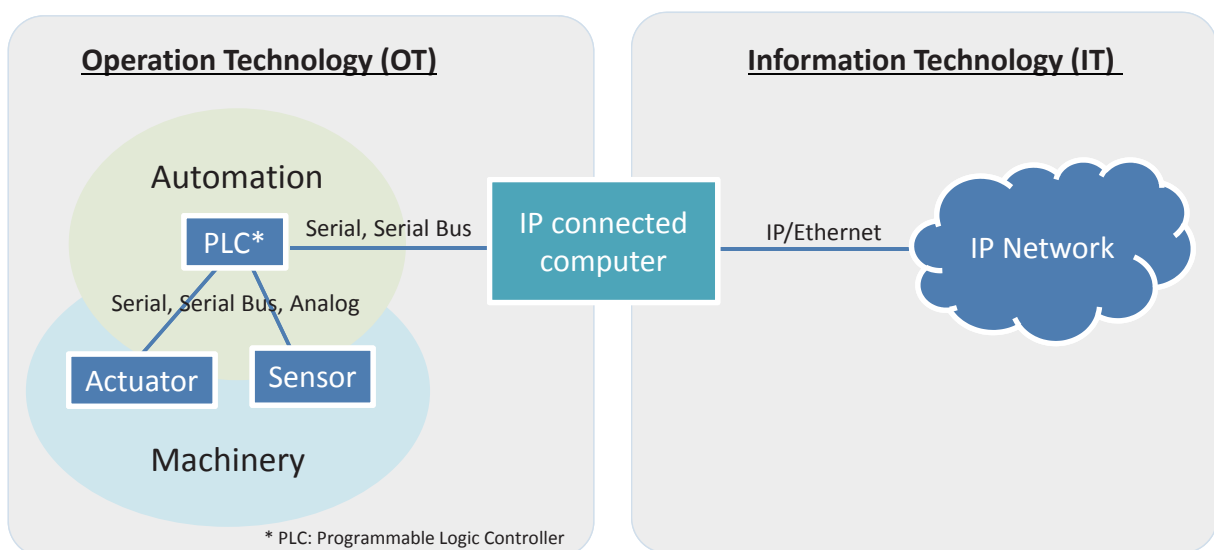
"Operation Technology (OT)" and "Information Technology (IT)" are to be bridged. The era of "transparency" where user can access field data.
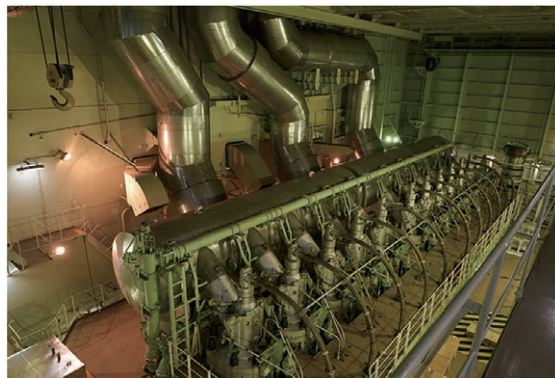
Coming IoT applications in marine industry

Target
- Prevent unpredicted downtime
- Reduce maintenance cost
- Energy efficiency in operation

Measure
- Condition monitoring
- Big data analysis
- Support service engineer
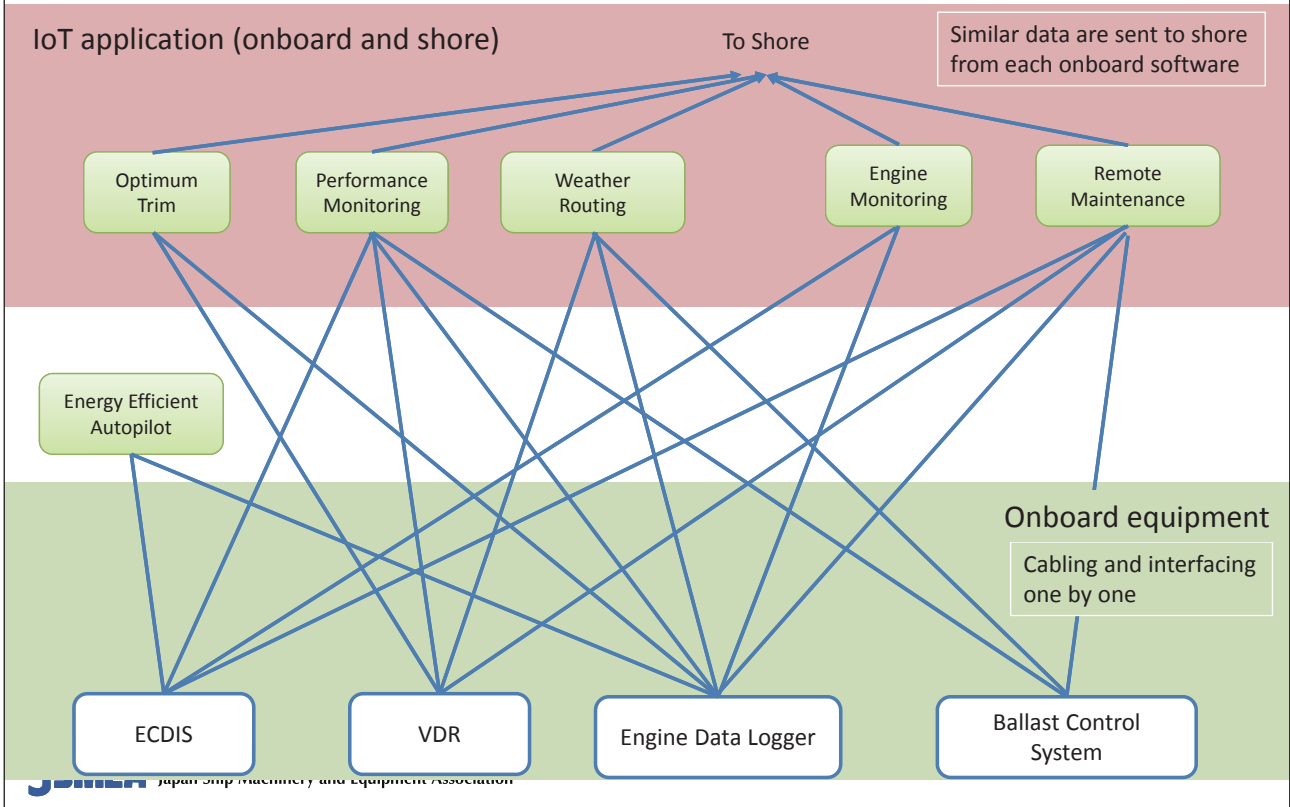- Intelligent machinery
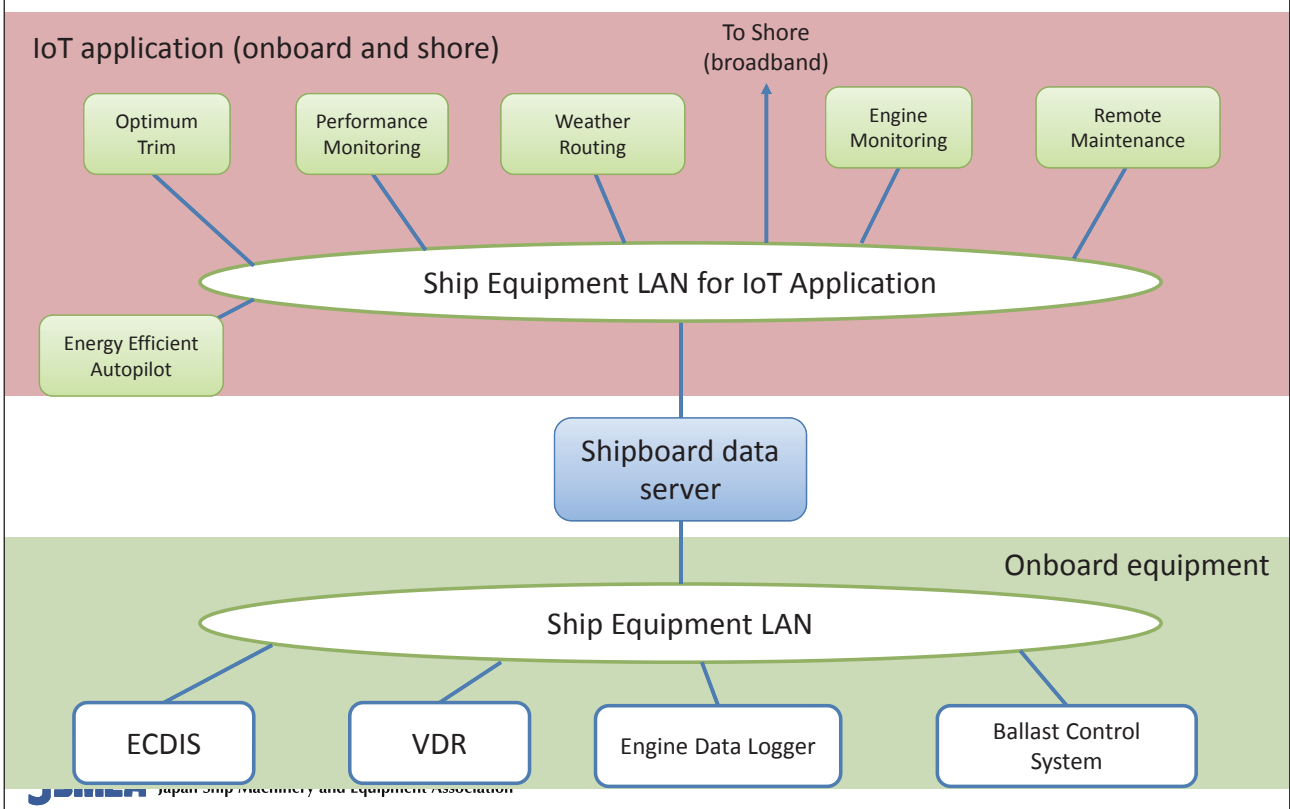 - Self diagnostics

Working style will be changed

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IoT and Big data applications

Role	Function	Example of IoT and Big data application
Ship owner	Technical management	• Safety operation • Condition monitoring & maintenance • Environmental regulation compliance • Hull & propeller cleaning • Retrofit & modification
	New building	• Design optimization
Ship operator	Operation	• Energy saving operation • Safe operation • Schedule management
	Fleet planning	• Fleet allocation • Service planning • Chartering

Other partners in value chains, such as cargo owners, shipyards, manufacturers, class societies, have also interests in ship Big data. With acceptance of IoT data owner, normally ship owner, Ship IoT will become prevalent.

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IoT application installation (now)

IoT application (onboard and shore)

To Shore

Similar data are sent to shore from each onboard software

- Optimum Trim
- Performance Monitoring
- Weather Routing
- Engine Monitoring
- Remote Maintenance

Energy Efficient Autopilot

Onboard equipment

Cabling and interfacing one by one

- ECDIS
- VDR
- Engine Data Logger
- Ballast Control System

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IoT application installation (future - SSAP2 target)

IoT application (onboard and shore)

To Shore (broadband)

- Optimum Trim
- Performance Monitoring
- Weather Routing
- Engine Monitoring
- Remote Maintenance

Ship Equipment LAN for IoT Application

Energy Efficient Autopilot

Shipboard data server

Onboard equipment

Ship Equipment LAN

- ECDIS
- VDR
- Engine Data Logger
- Ballast Control System

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Concept of Ship - Shore Open Platform
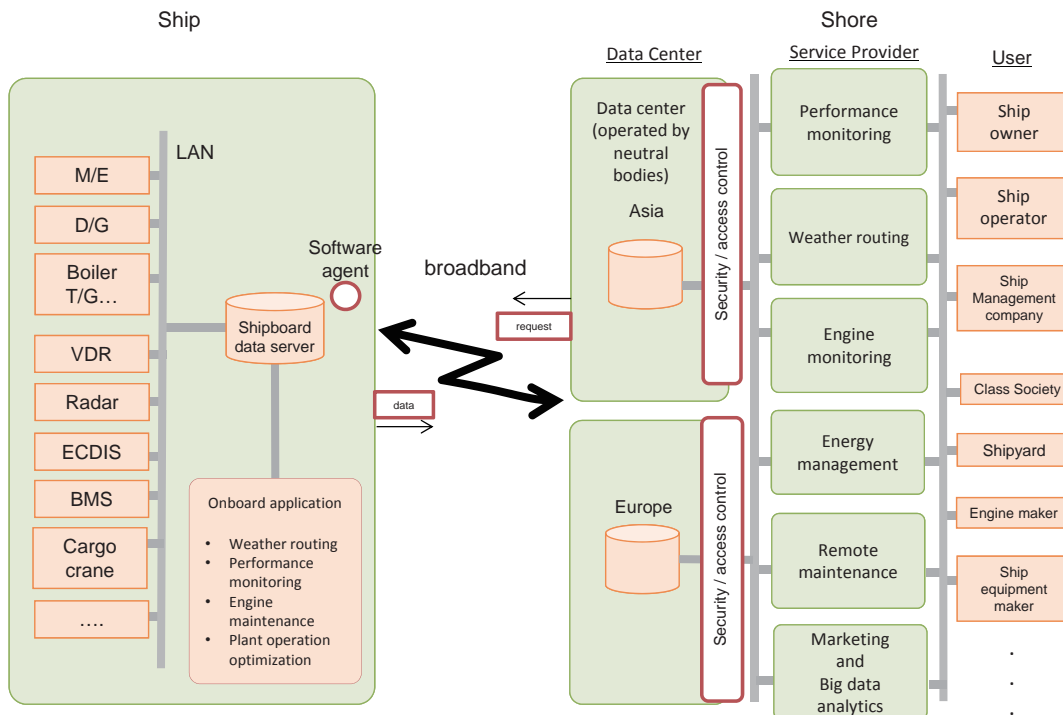
What are the benefits of such platform ?

- ✓ Application providers can easily provide onboard and shore application software / services

- ✓ Equipment manufacturers can easily provide their services, such as remote maintenance -> Ship owners can get remote maintenance supports directly from manufacturers

- ✓ Ship owners investment cost (CAPEX and OPEX) for onboard applications and shore services will be lower -> more big data applications will be used

- ✓ Shipyards and equipment manufactures can collect data from running equipment -> better understanding for service performances

- ✓ Ship owners can manage/control ship data transmission to shore

- ✓ Standardized format and protocol will enhance application development

SSAP Project (Dec 2012 – Mar 2015)

- Participants
  - Members: 27 organizations
  - Observers: 9 organizations

- Joint Industry Project (JIP) supported by JSMEA + ClassNK

- Achievements
  - Design specification of shipboard data server
  - Implementation of shipboard data server and trials on 2 domestic vessels
  - Ship – shore open platform design for ship IoT
  - Proposed 2 ISO NPs (ISO NP19847 / ISO NP19848)

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Onboard trials in SSAP (2014)

RORO Ferry
SUNFLOWER SHIRETOKO

Crude-Oil Tanker
SHINKYOKUTO MARU

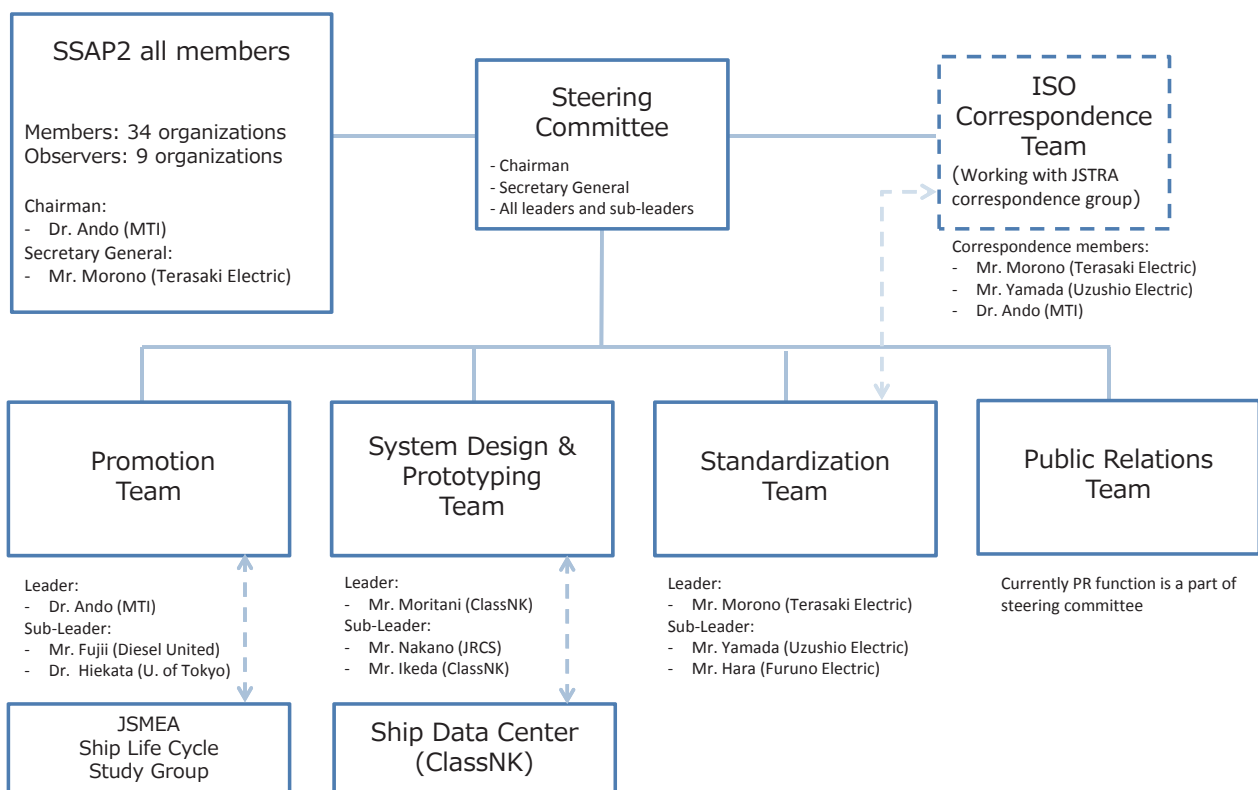JSMEA Japan Ship Machinery and Equipment Association

SSAP2 Project
(Smart Ship Application Platform 2 Project)

- Participants
    - 34 members + 9 observers
- Schedule
    - Aug. 2015 – Oct. 2017
- Action items
    1. Promotion of SSAP2 concept
    2. System design and prototyping of SSAP2
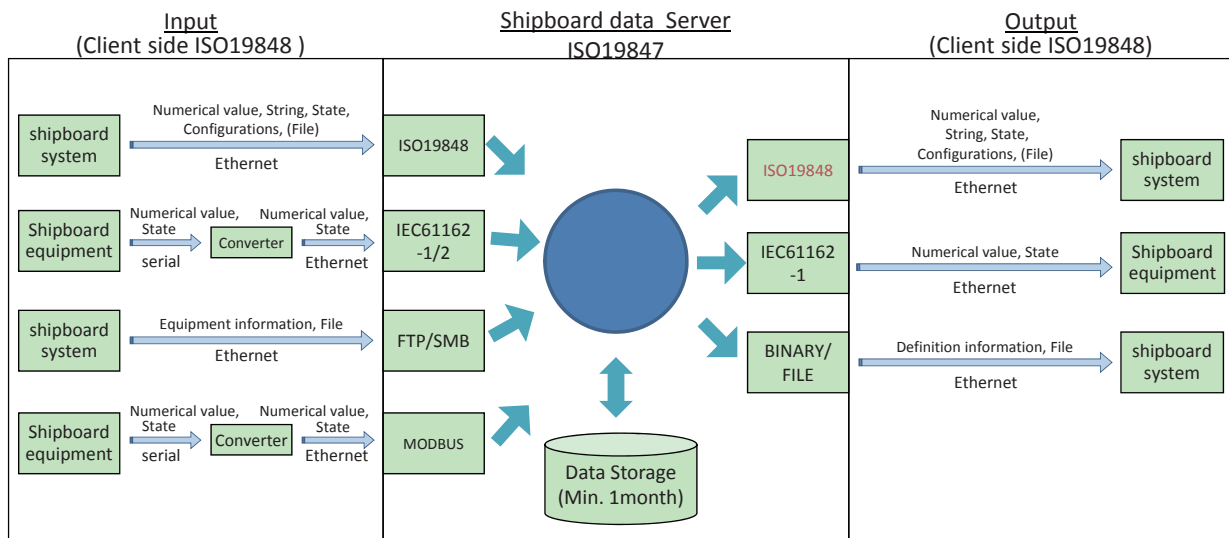   3. Standardization – ISO WD19847/WD19848
    4. Public relations

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Organization of SSAP2 Project

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ISO WD 19847
Shipboard data servers to share field data on the sea

- Requirements for shipboard data server

Input (Client side ISO19848)	Shipboard data Server ISO19847	Output (Client side ISO19848)

shipboard system — Numerical value, String, State, Configurations, (File) / Ethernet → ISO19848

Shipboard equipment — Numerical value, State / serial → Converter → Numerical value, State / Ethernet → IEC61162-1/2

shipboard system — Equipment information, File / Ethernet → FTP/SMB

Shipboard equipment — Numerical value, State / serial → Converter → Numerical value, State / Ethernet → MODBUS

Data Storage (Min. 1month)

ISO19848 → Numerical value, String, State, Configurations, (File) / Ethernet → shipboard system

IEC61162-1 → Numerical value, State / Ethernet → Shipboard equipment

BINARY/FILE → Definition information, File / Ethernet → shipboard system

ISO WD 19848
### Standard data for shipboard machinery and equipment

- Data channel
- Time series data
- Data format
  - Data channel list
  - Time series data

	Data Channel A	Data Channel B	Data Channel C
Timestamp 1	1.0	1.1	LowTemp
Timestamp 2	0.5	0.4	
Timestamp 3	10	15	Normal

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Policy of standardization

❖ Corroborate and harmonize with
  - Existing standards
    - IEC61162-450/460(Digital Interface – Part 450 Multiple taker and multiple listeners – Ethernet interconnection)
    - ISO16425 (Guidelines for the installation of ship communication networks for shipboard equipment and systems)
  - New proposed standards
    - IHO S-100series
    - IEC BAM(Bridge alert management – Operational and performance requirements, methods of testing and required test results)
  - Associated projects / Organization
    - e-Navigation(IALA)
    - SMART-Navigation(Korea)
    - IEC etc.,
  - Cyber Security discussions

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## Process for ISO (ISO WD19847, ISO WD19848) *
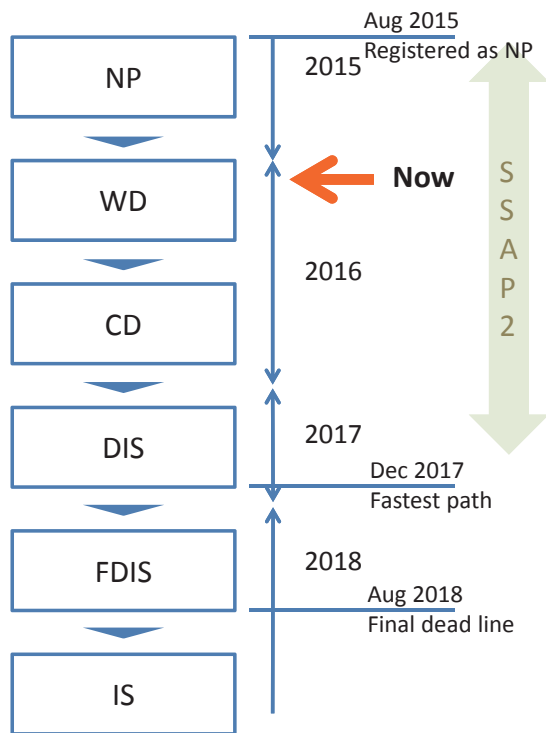
- ISO PWI 19847/19848 were accepted as NP in Aug 2015

- 2 WDs were finalized WD in Feb 2016 and are currently under review by international experts

- The first ISO/TC8/SC6/WG16 meeting will be held in June in Tokyo

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

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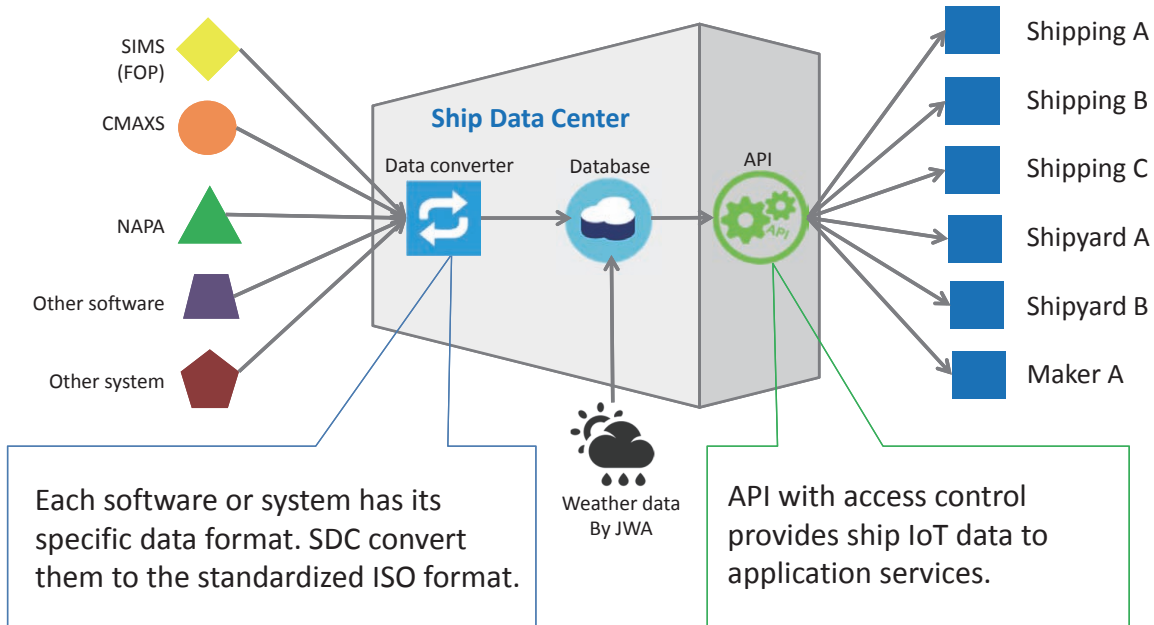

Ship–shore open platform for Ship IoT

Ship-shore open platform provides good security and access control to enhance cooperation with industry partners for utilizing Ship IoT data.

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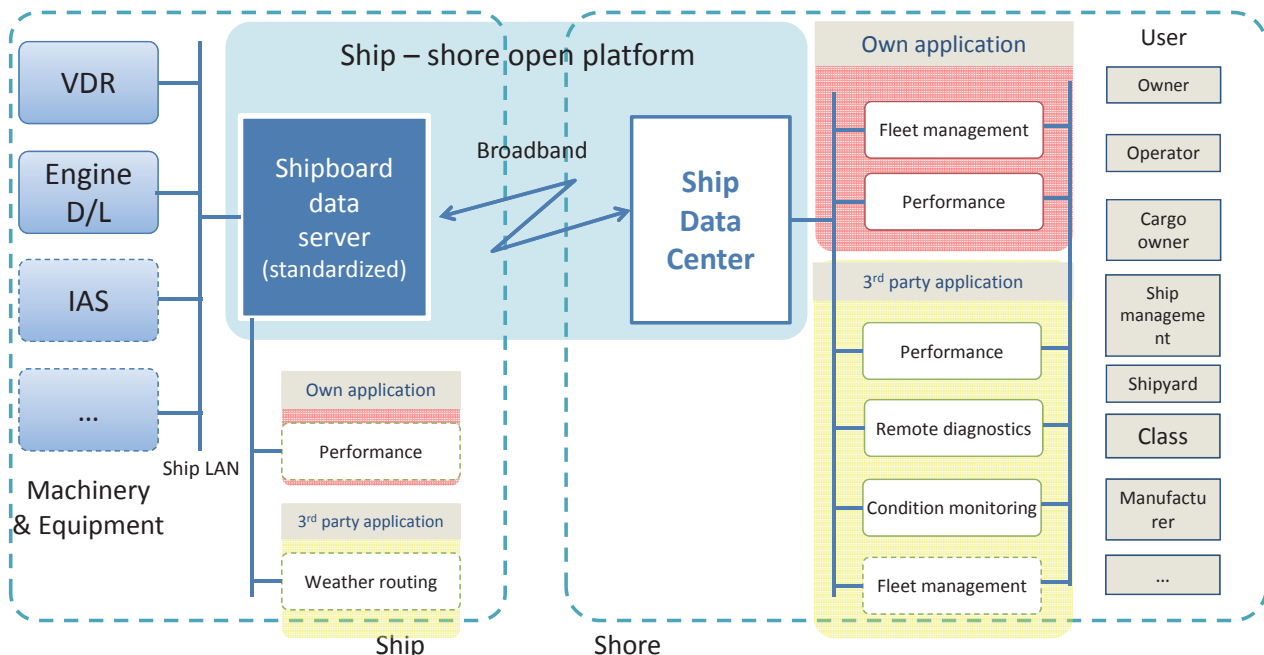
Ship Data Center at Shore

Ship data center provides a platform to access ship IoT data safely, easily and reasonably. With the platform, utilizations of ship IoT data at shore will become much easier and it will enhance development and operation of ship IoT application services.

SIMS (FOP)
CMAXS
NAPA
Other software
Other system

Ship Data Center

Data converter
Database
API

Weather data By JWA

Shipping A
Shipping B
Shipping C
Shipyard A
Shipyard B
Maker A

Each software or system has its specific data format. SDC convert them to the standardized ISO format.

API with access control provides ship IoT data to application services.
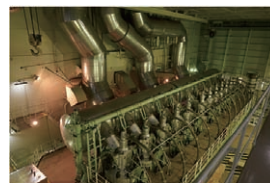

Use Case Scenarios of Ship Data Center

Shipping
- Safety operation
- Vessel performance analysis
- Fleet operation optimization
- Weather routing

Shipyard
- In-service performance analysis of delivered ships
- Feedback to new ship design

Maker
- Remote condition monitoring
- Remote diagnostics
- After service support

Class Society
- Utilization in class inspection

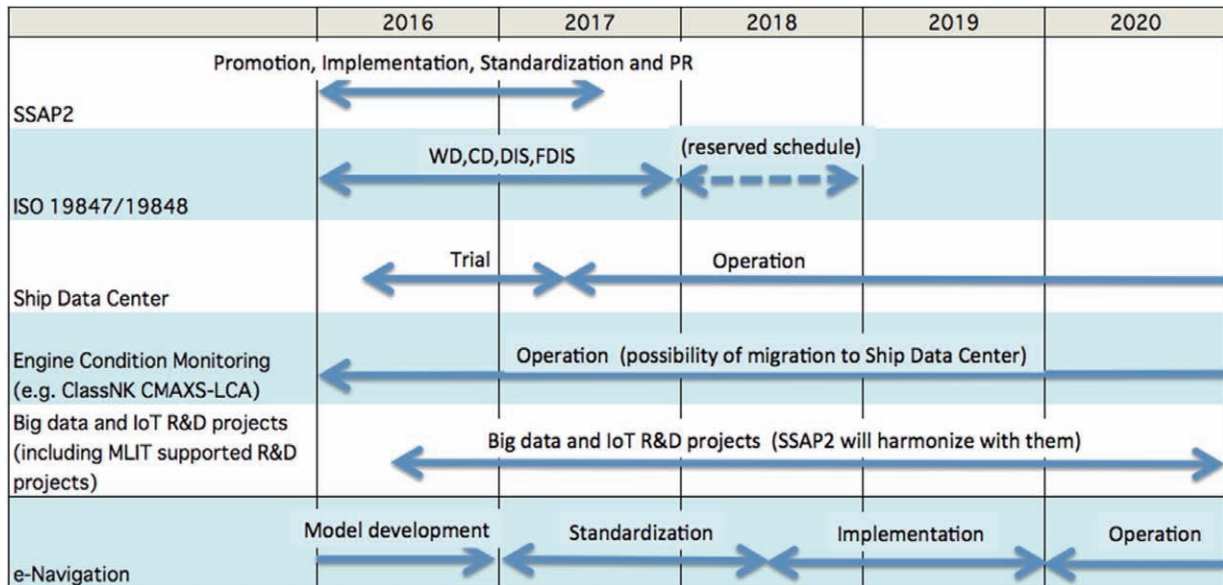**Software vendor**
- Application services

Insurance/Bank
- New services

Ship Data Center

Schedule (estimation)

	2016	2017	2018	2019	2020
SSAP2	Promotion, Implementation, Standardization and PR				
ISO 19847/19848	WD,CD,DIS,FDIS		(reserved schedule)		
Ship Data Center	Trial		Operation		
Engine Condition Monitoring (e.g. ClassNK CMAXS-LCA)		Operation (possibility of migration to Ship Data Center)			
Big data and IoT R&D projects (including MLIT supported R&D projects)		Big data and IoT R&D projects (SSAP2 will harmonize with them)			
e-Navigation	Model development	Standardization	Implementation		Operation

Summary

- JSMEA, Class NK, 34 member organizations and 9 observers are working together as SSAP2 (Smart Ship Application Platform 2) Project

- The aim of SSAP2 Project is to design and to implement an open platform for supporting Ship IoT service development and operation

- SSAP2 follows up ISO WD 19847/WD 19848 standardization process

- Ship Data Center is a platform for shore side Ship IoT applications. SSAP2 work closely with Ship Data Center to achieve the open platform concept.

Thank you very much for your attention

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