Activities of Smart Ship Application Platform 2 Project (SSAP2)

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Background

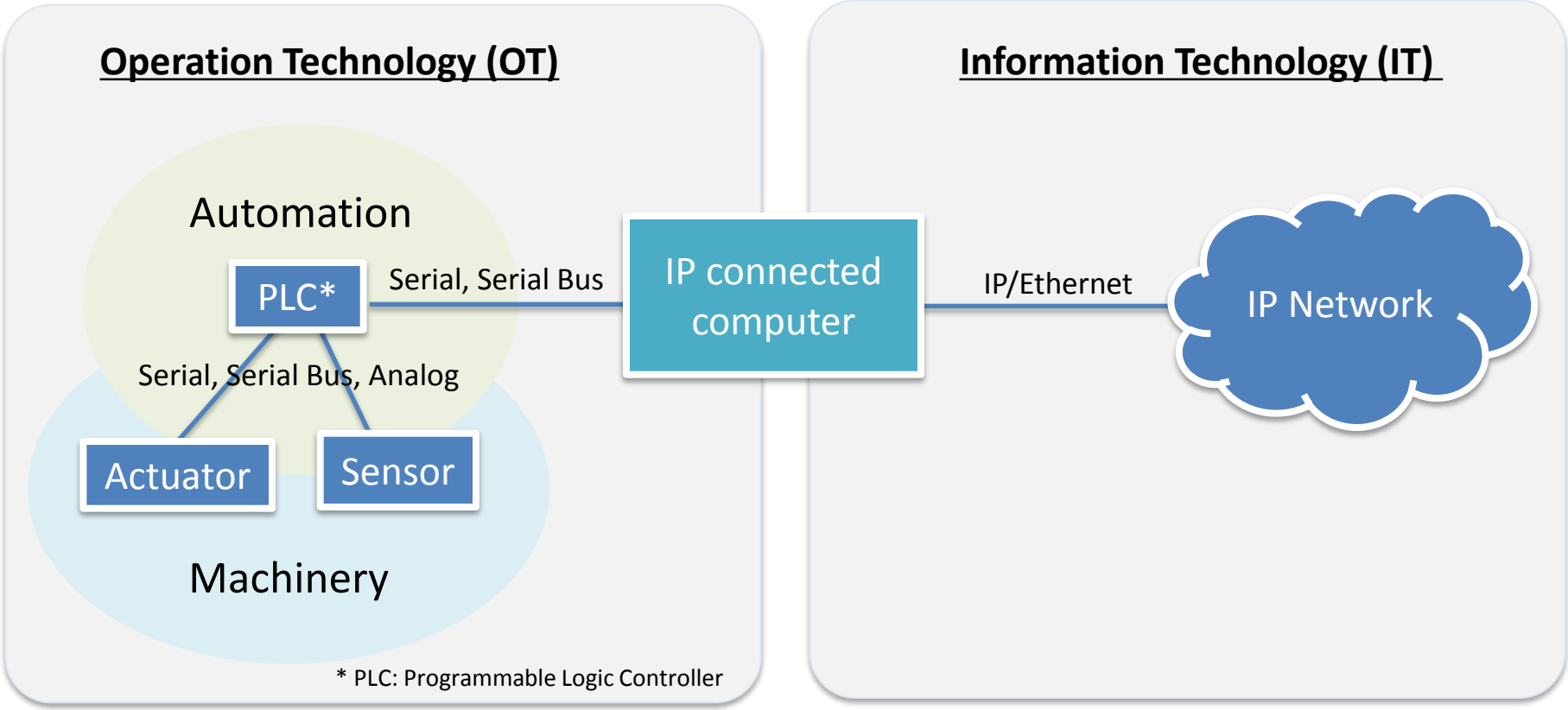
- Onboard and Shore IoT application services, which rely on ship onboard equipment data, have become much more expanding.
  - Weather routing
  - Optimum trim
  - Performance monitoring
  - Engine monitoring
  - Condition monitoring
  - Power plant energy management
  - Remote maintenance

Smart Ship and SSAP

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

- The target of SSAP (SSAP & SSAP2) projects is to support these Ship IoT application services in order to access ship equipment data easily and to enhance developing further application services for a better stage.

IoT (Internet of Things)



"Operation Technology (OT)" and "Information Technology (IT)" are to be bridged.
The era of "transparency" in which 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

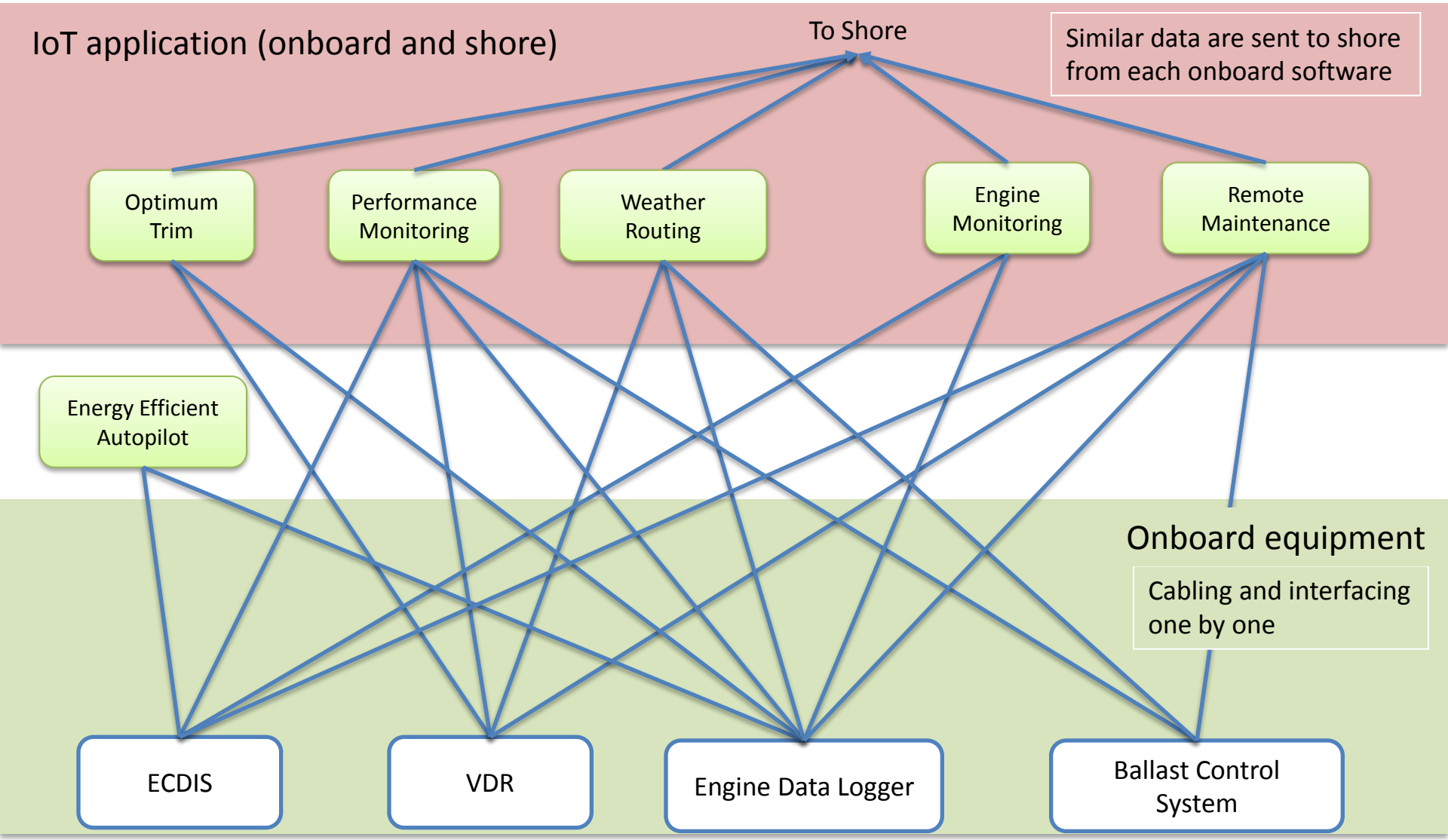
Working style will be changed

IoT and Big data applications

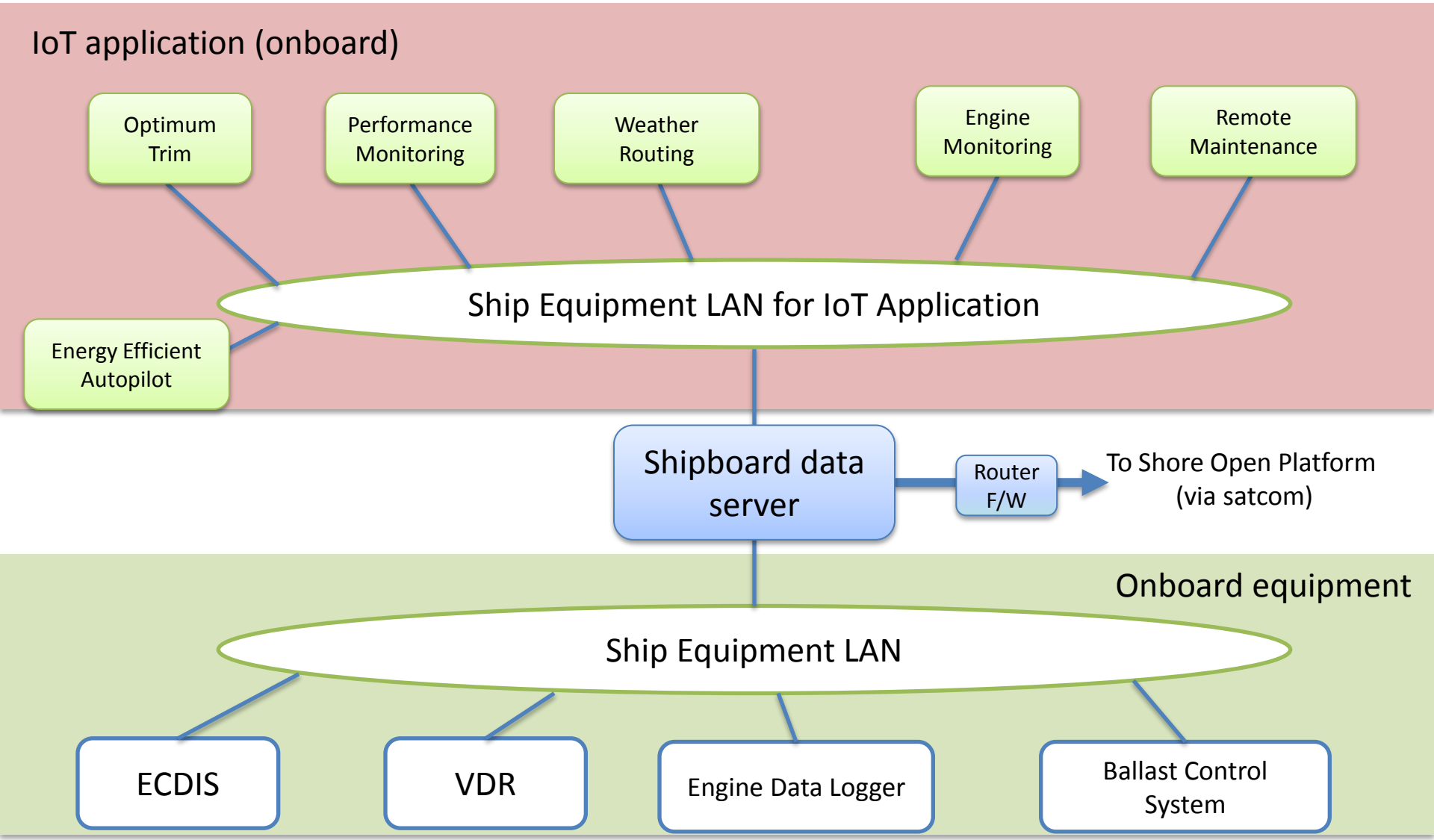
Role	Function	Example of IoT and Big data application
Ship owner	**Technical management**	• Safety operation • Condition monitoring & maintenance • Environmental regulation compliance • Hull & propeller cleaning • Retrofit & modification
	New building	• Design optimization
Ship operator	**Operation**	• Energy saving operation • Safe operation • Schedule management
	Fleet planning	• Fleet allocation • Service planning • Chartering
Shipyard	**In-service ship**	• Ship performance analysis
	New building	• Design optimization
Manufacturer	**Maintenance**	• Remote monitoring & diagnosis

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

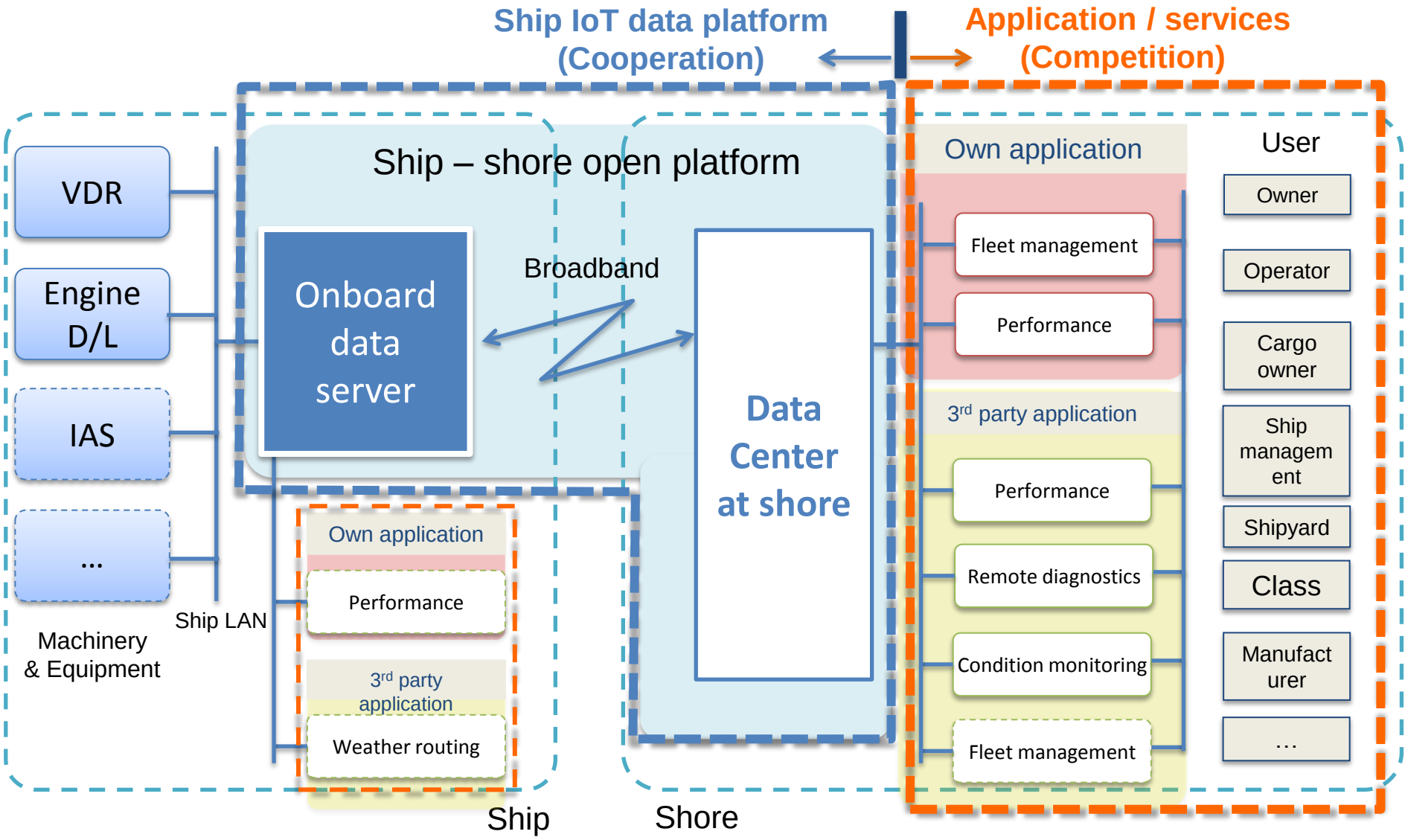
IoT application installation (now)



IoT application installation (future - SSAP2 target)



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 economized
  -> 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

SSAP1 Project
(Smart Ship Application Platform 1 Project)

- Participants
  - Members: 27 organizations
  - Observers: 9 organizations
- Schedule
  - Dec. 2012 – Mar. 2015
- Joint Industry Project supported by JSMEA + Class NK
- 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)

Onboard trials in SSAP1 (2014)

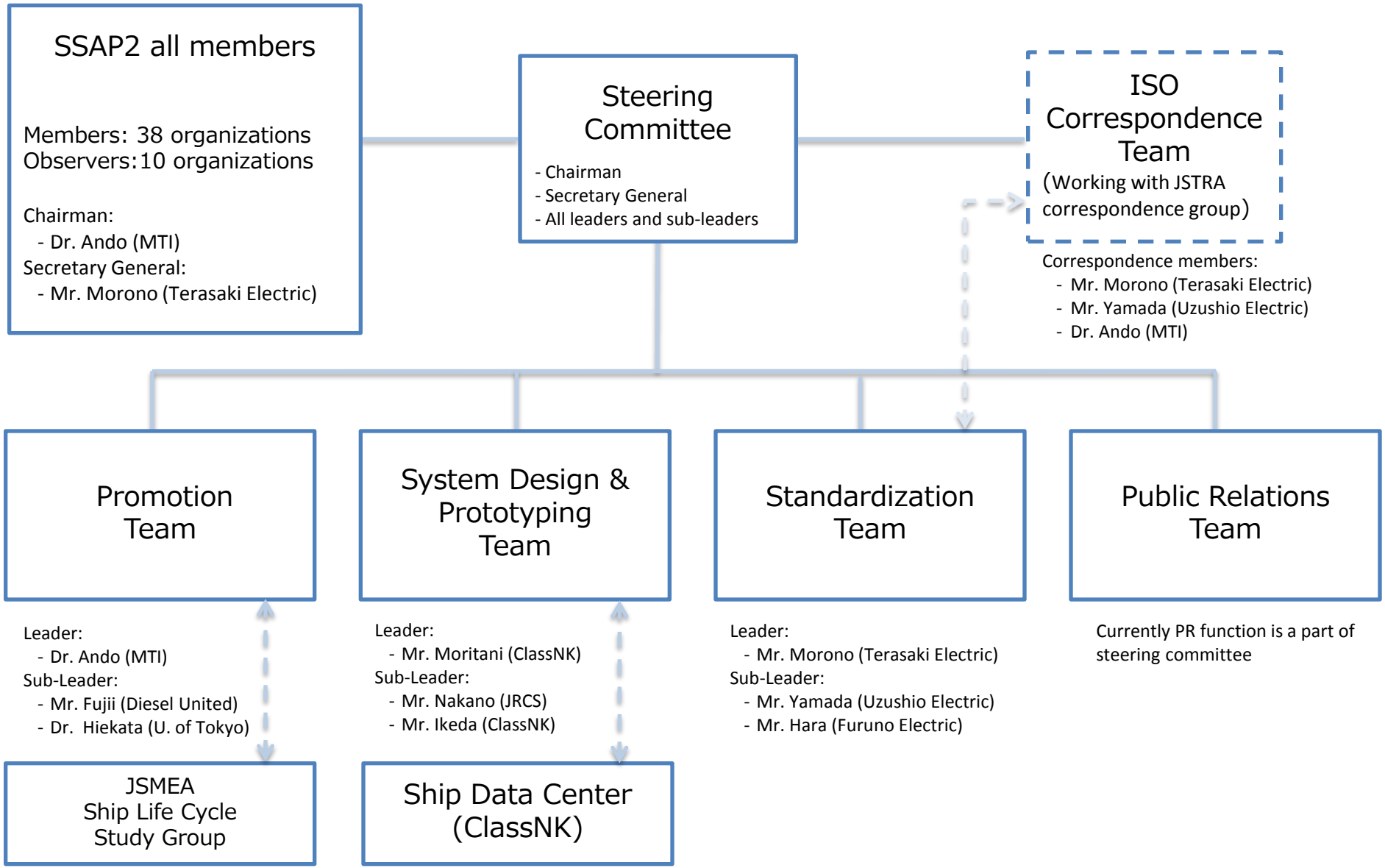
RORO Ferry
SUNFLOWER SHIRETOKO

Crude-Oil Tanker
SHINKYOKUTO MARU

SSAP2 Project
(Smart Ship Application Platform 2 Project)

- Participants
  - Members: 38 organizations
  - Observers: 10 organizations
- Schedule
  - Aug. 2015 – Sep. 2017
- Joint Industry Project supported by JSMEA + Class NK
- Action items
  1. Promotion of SSAP2 concept
  2. System design and prototyping of SSAP2
  3. Standardization – ISO DIS19847/DIS19848
  4. Public relation

Organization of SSAP2 Project

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NIPPON YUSEN KAISHA

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Mitsui O.S.K. Lines

K LINE

ClassNK

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Monohakobi
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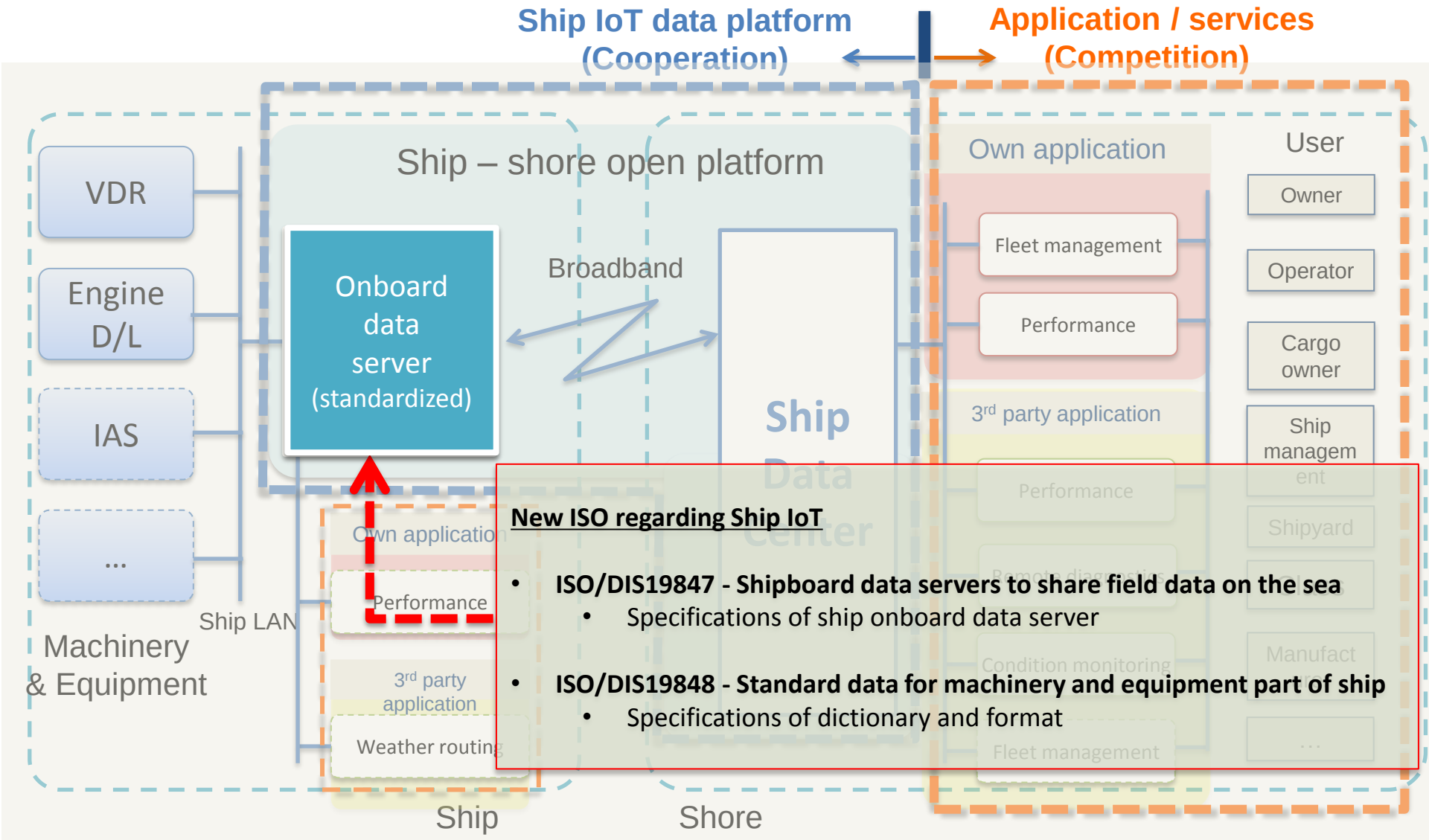
JSMEA
Japan Ship Machinery and Equipment Association

SSAP

ISO DIS 19847/19848 for Ship IoT



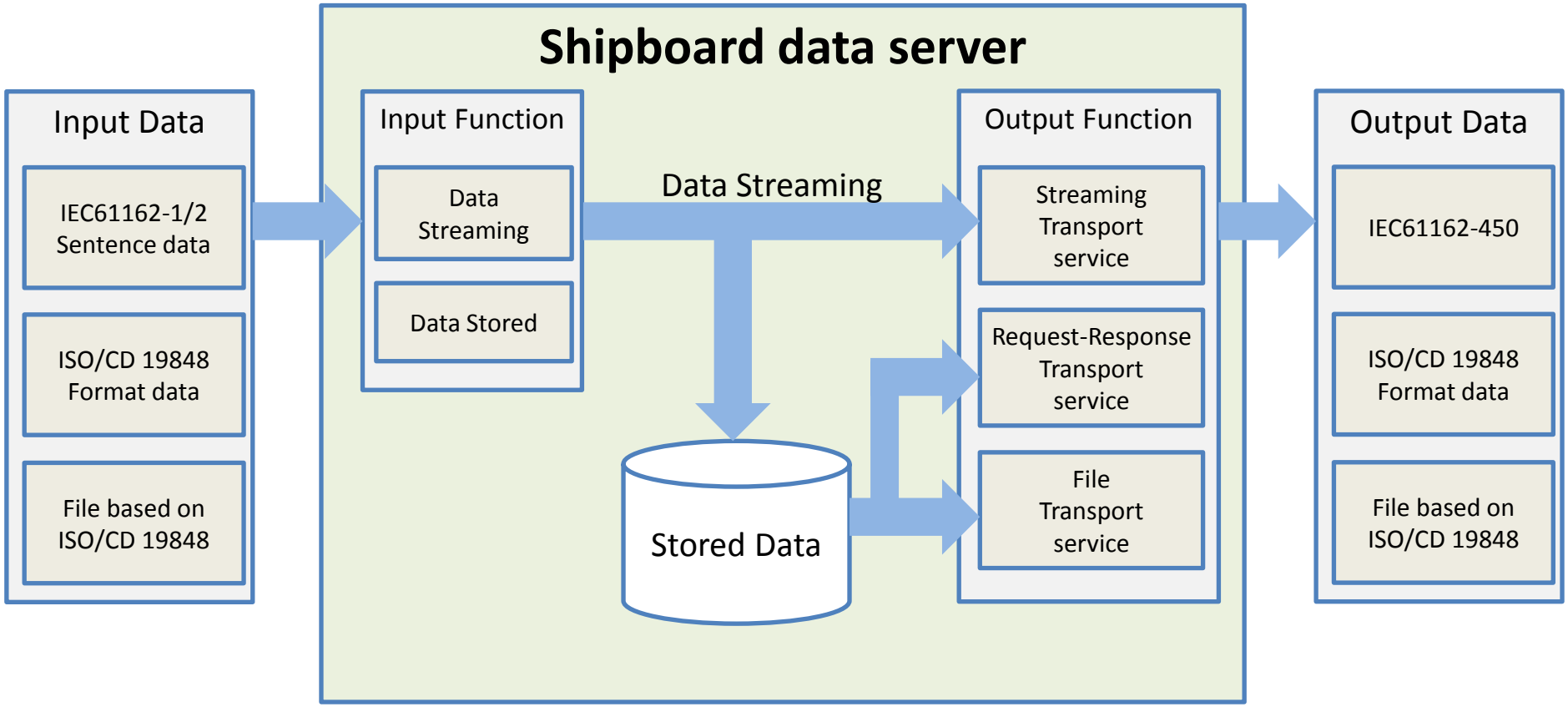
New ISO regarding Ship IoT

- **ISO/DIS19847 - Shipboard data servers to share field data on the sea**
  - Specifications of ship onboard data server
- **ISO/DIS19848 - Standard data for machinery and equipment part of ship**
  - Specifications of dictionary and format

ISO DIS 19847

Shipboard data servers to share field data on the sea

- Requirements for shipboard data servers to collect and share field data



ISO DIS 19848

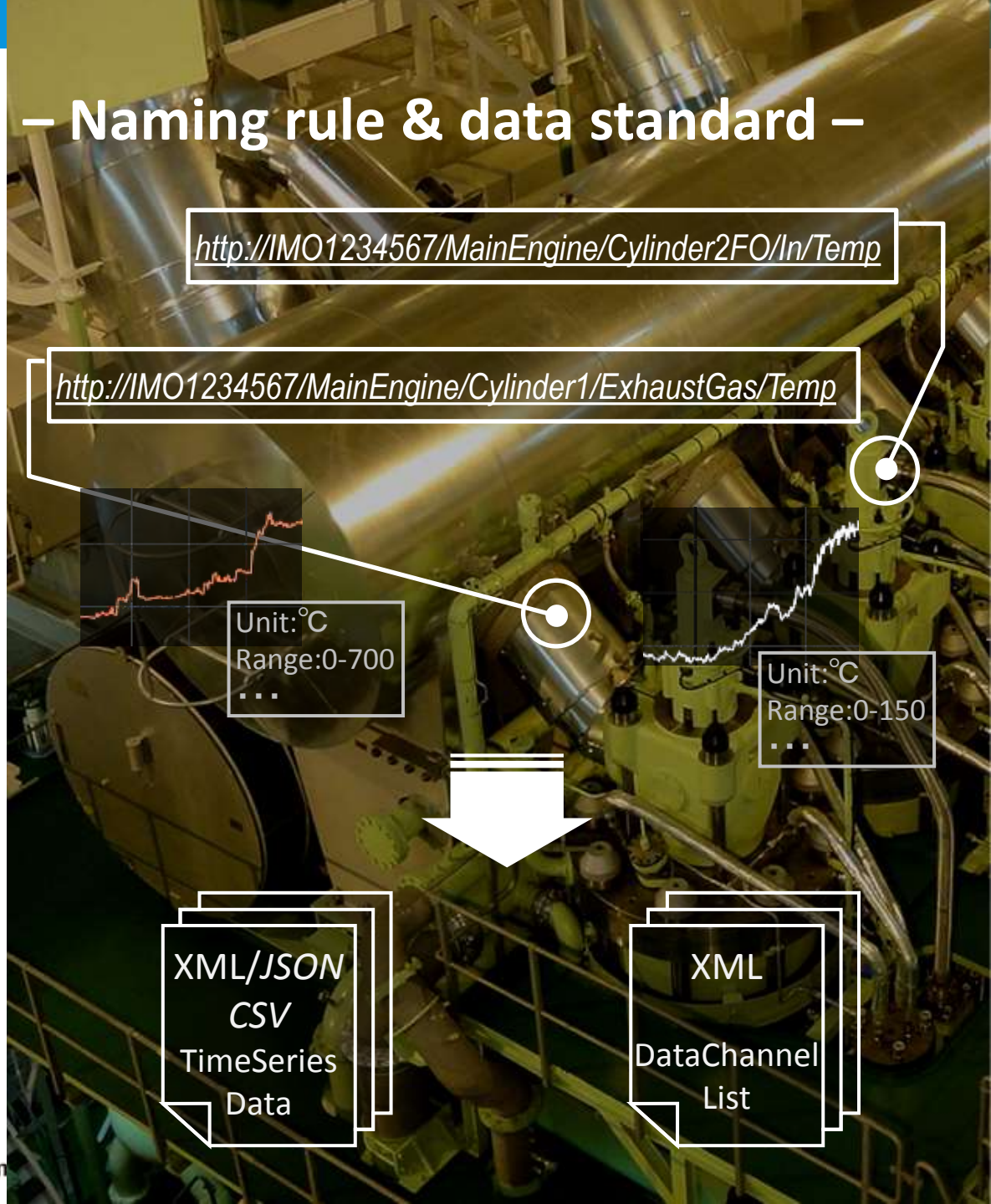
– Naming rule & data standard –

- ***Standardized ID of sensors, common data model & format***

- **ID of sensors**
  - ***URL*** compliant naming scheme
  - Dictionaries (*informative*)
    - JSMEA
    - DNV-GL

- **Data model**
  - Data channel list (meta data)
  - Time series data (data)

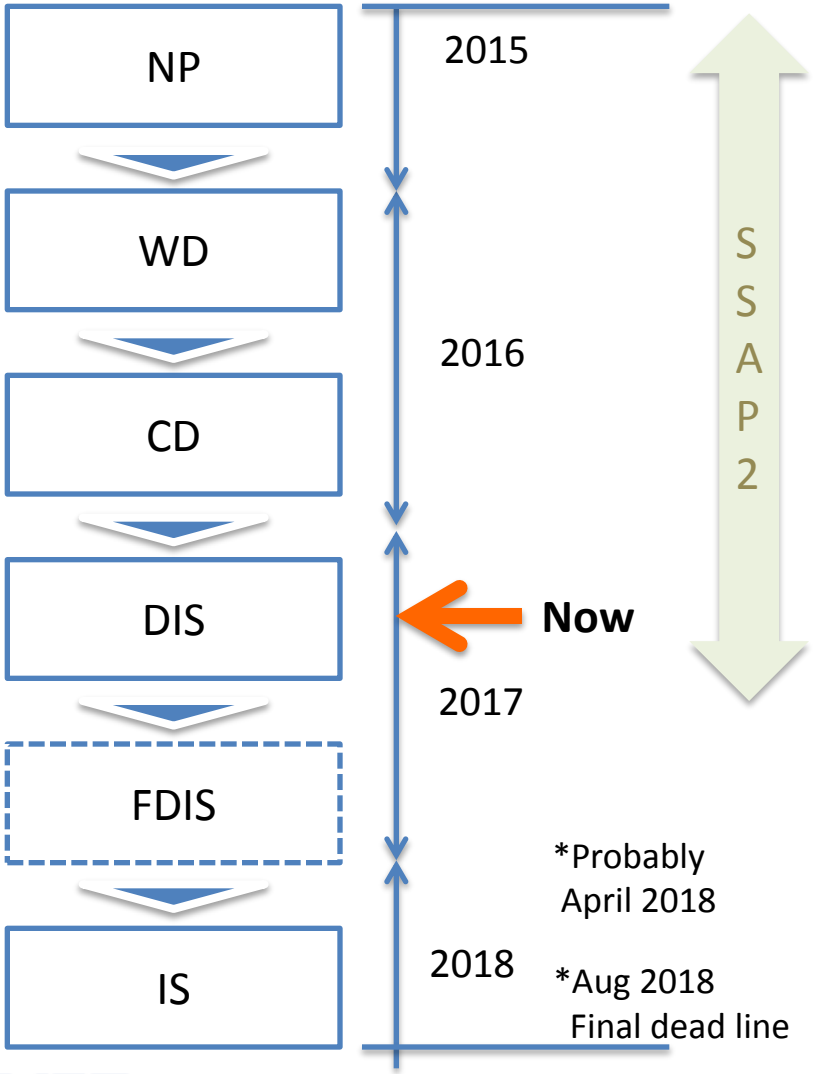
- **Data format**
  - ***XML*** with schema definition
  - *JSON (informative)*
  - *CSV (informative)*



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

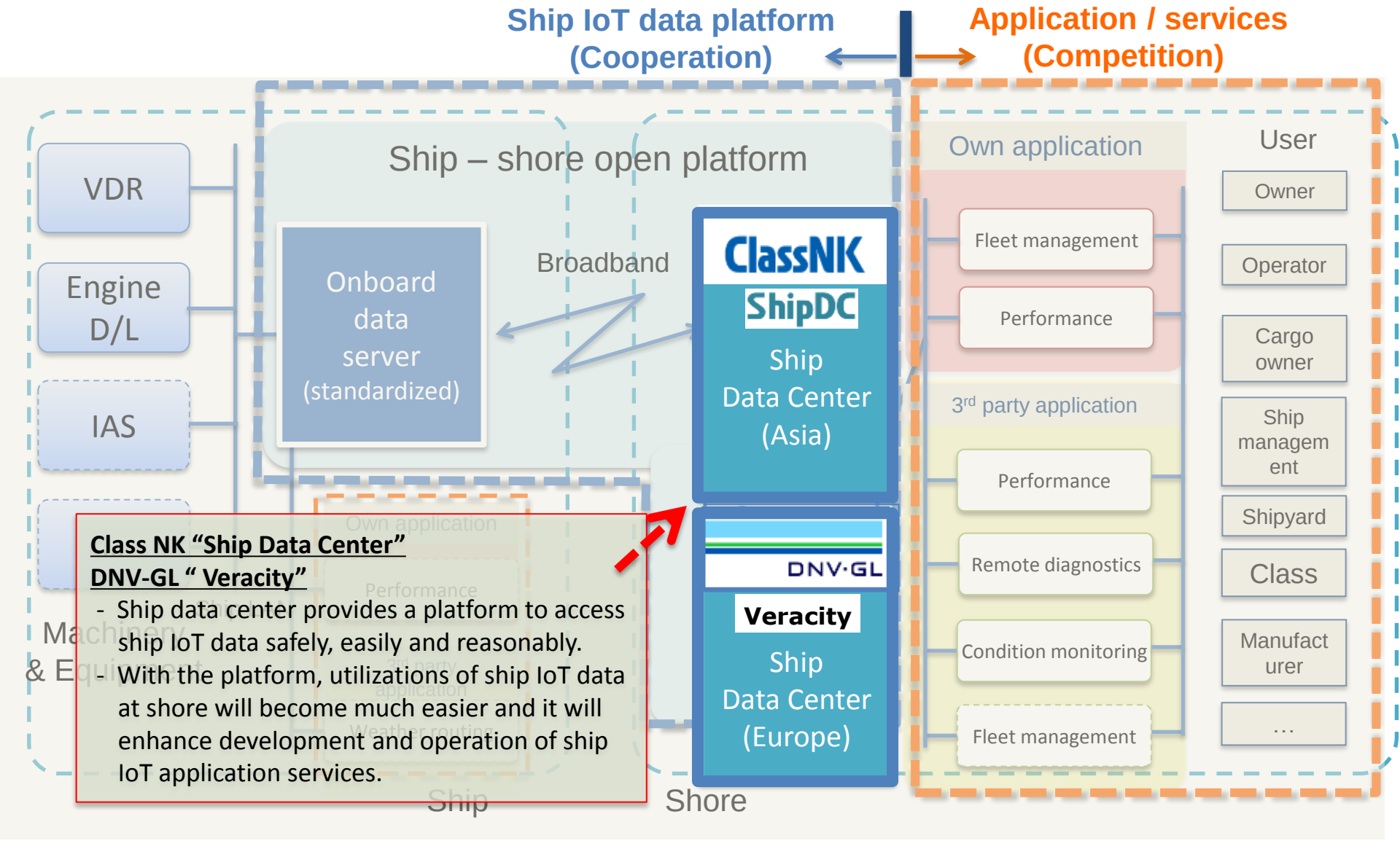
Process for ISO (ISO 19847, ISO 19848) *



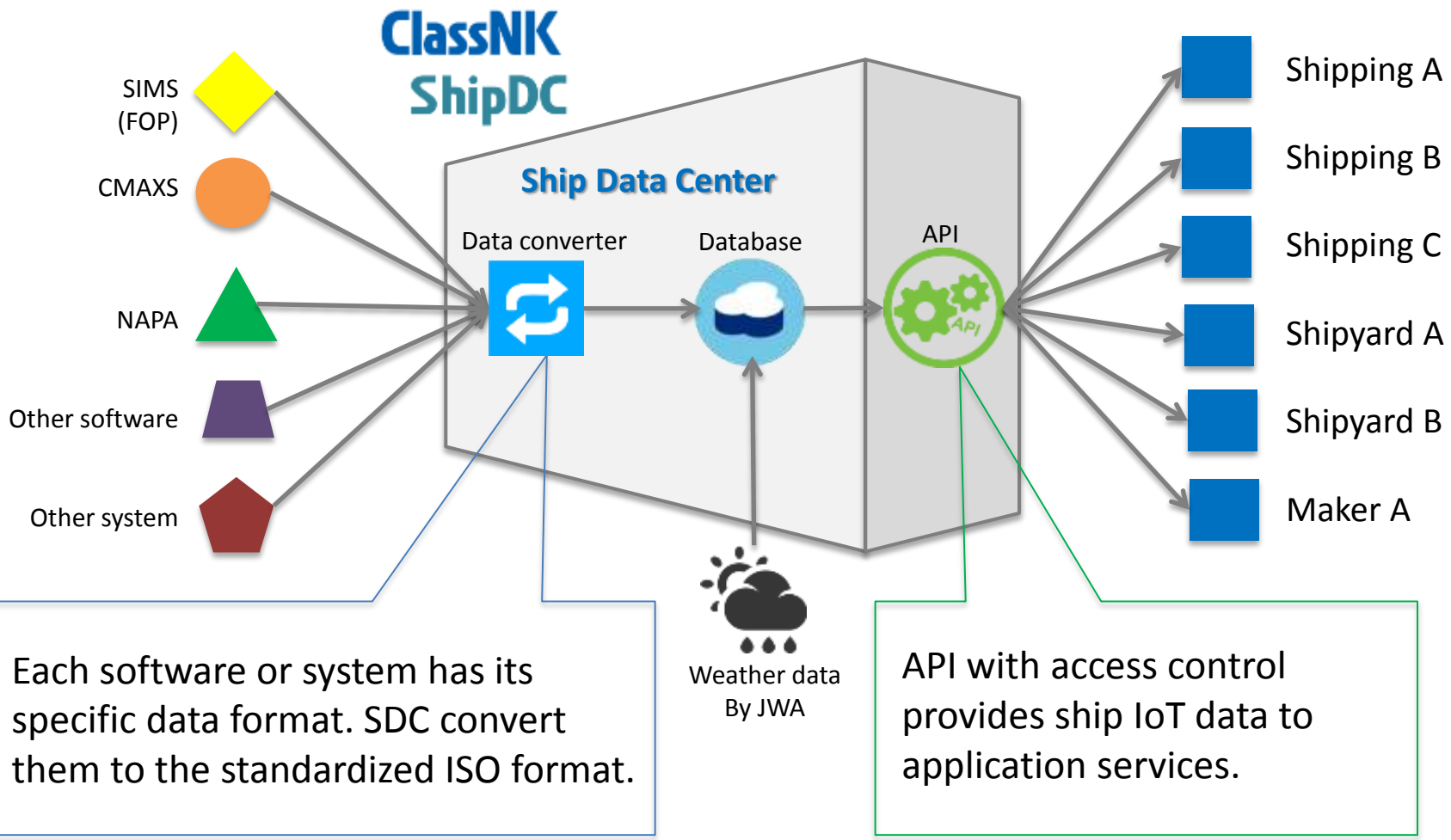
- ISO PWI 19847/19848 were accepted as NP in Aug. 2015
- 2 CDs were accepted as DIS in Nov. 2016
- 2 DISs will be distributed for comment and voting to the members of ISO/TC8/SC6 in June. 2017

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

Ship Data Center at Shore



ClassNK Ship Data Center at Shore



Roadmap regarding digitalization toward 2020

	Topic	2016	2017	2018	2019	2020
Application	R&D projects (e.g. i-Shipping in Japan and autonomous ships in Europe)	R&D projects (Navigation, engine, hull, cargo, operation and etc.)				
	PHM*1 services & products (Machinery & equipment)	Condition monitoring and PHM for main engine, machineries and equipment.				
	IT and IoT utilization in fleet operation	Integration of ship with shore operation system. Optimization, automation and simulation technologies.				
Platform	Ship IoT standardization (ISO CD 19847/19848) and other ISOs	ISO 19847/19848		(FDIS)	Smart Ship related ISOs ?	
	Ship data center		Trials & Operation			
Regulatory	Cyber security	BIMCO guideline, IMO MSC guideline, Class guideline ↔ IACS Cyber Security Panel				
	MRV *2				IMO MRV EU MRV	
	e-Navigation and autonomous ship regulations	Model development	Standardization		Implementation	Operation
		Several autonomous ship projects in Norway, Finland and in other nations				

*1 PHM: Prognostics and Health Monitoring, *2 MRV: Monitoring Reporting and Verification

Summary

- JSMEA, Class NK, 38 member organizations and 10 observers are working together for 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 DIS 19847/ 19848 standardization process

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

Thank you very much for your attention

For further information, please contact

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JSMEA, Japan Ship Machinery and Equipment Association
http://www.jsmea.or.jp/ssap

Ship Data Center(Class NK)
http://www.shipdatacenter.com