Smart Ship Application Platform Project (SSAP Project)

Japan Ship Machinery & Equipment Association
SSAP Project

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Background

- Onboard and shore-based 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
- The concept of Smart Ship is to utilize such application services to achieve optimum ship operation in terms of safety and energy efficiency.
- The target of SSAP project is to support these application services to access ship equipment data easily and enhance more and more application services development

SSAP Project

- Smart Ship Application Platform Project (SSAP)
- Participants
  - Members: 27 organizations
  - Observers: 9 organizations
- Joint Industry Project (JIP) supported by JSMEA + Class NK
- Project schedule
  - Dec 2012 – March 2015
- Budget
  - Approx. 1.2 Million USD (120 Million JPY)
  - Class NK funding + participant fees from members

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Image of onboard application installation (now)

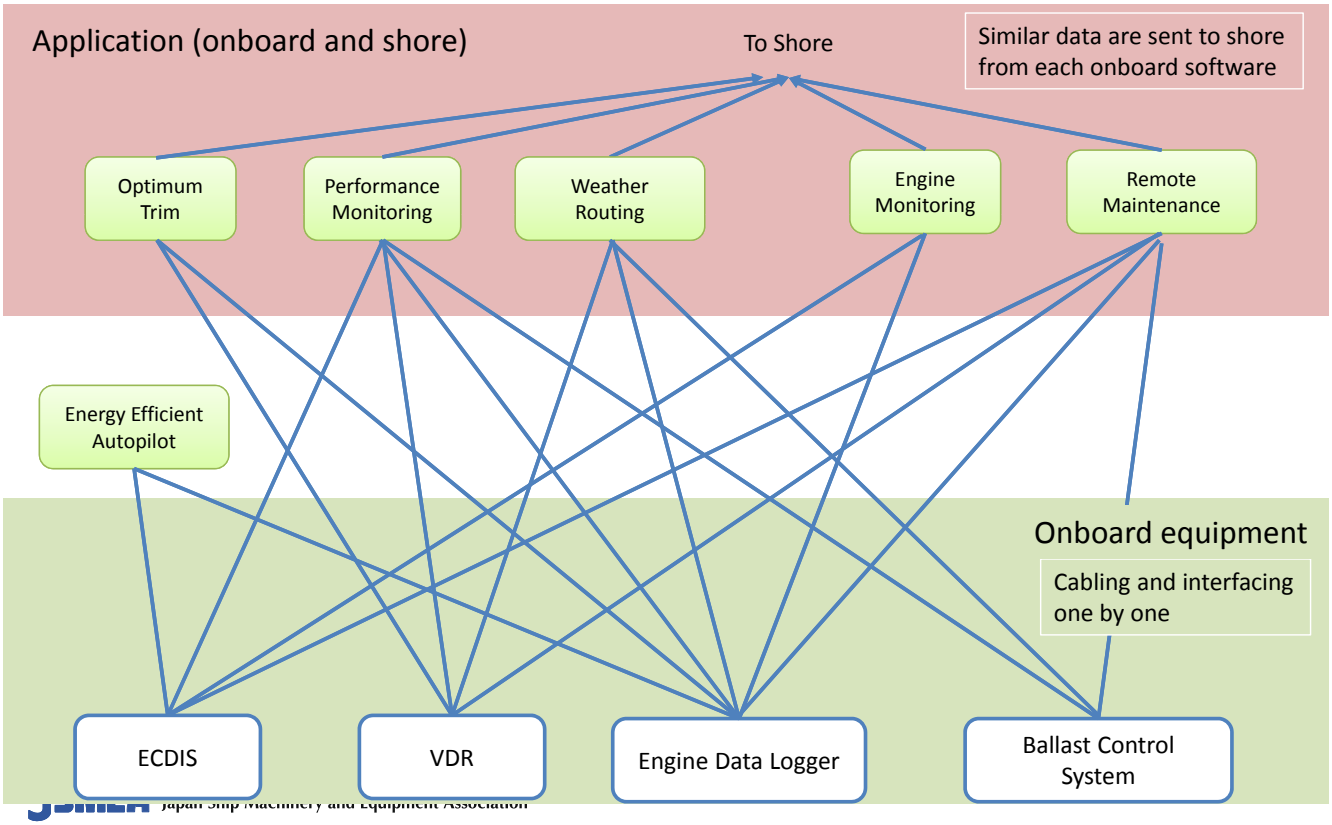

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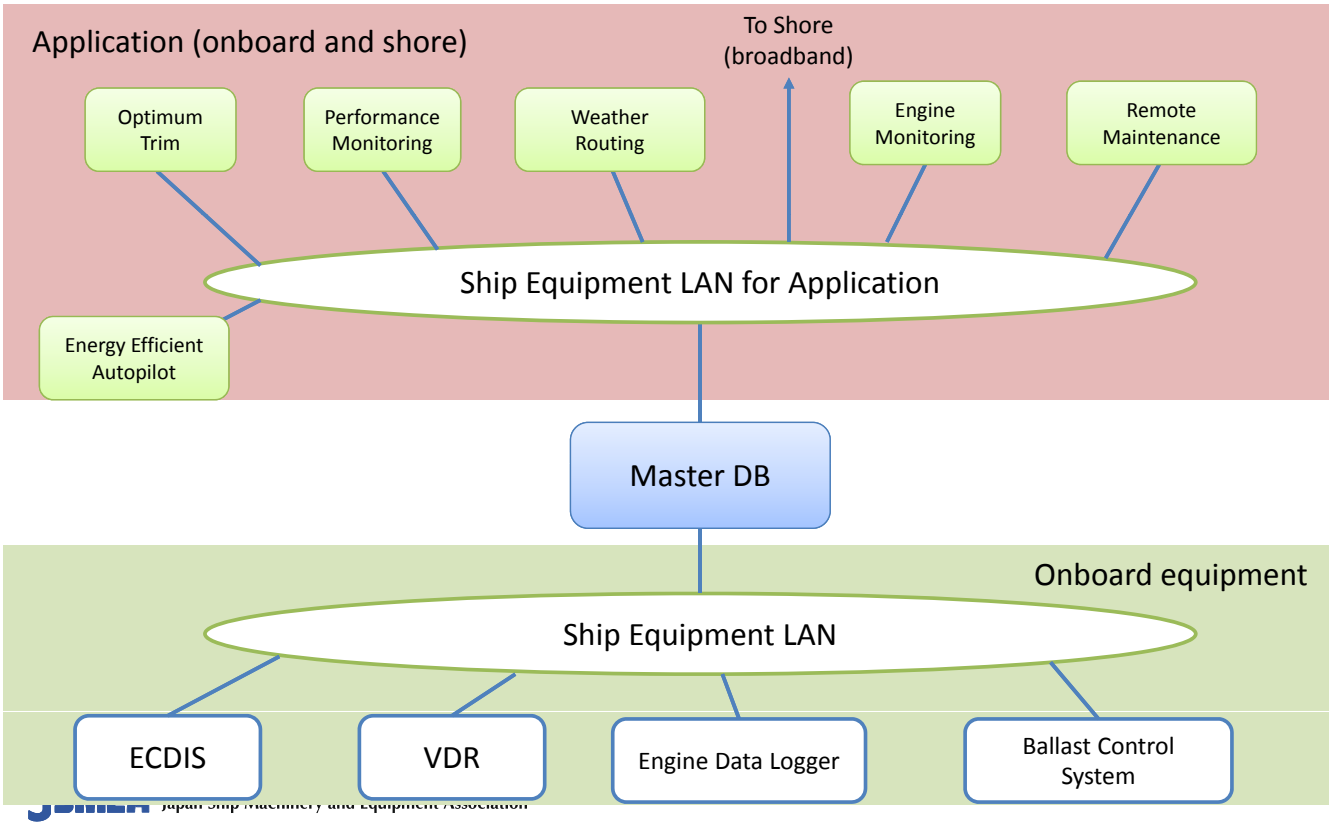
Image of onboard application installation (future)



Main action items

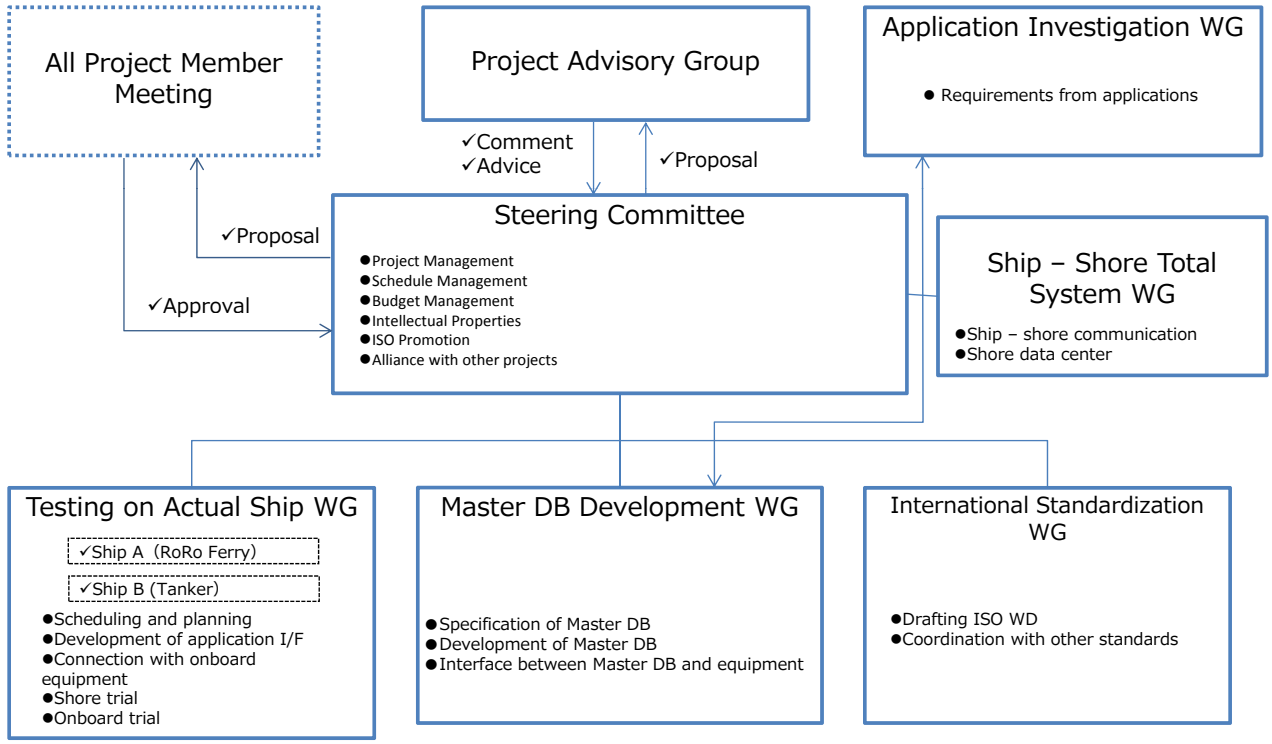
1. Develop specifications of Master Database and its interface
   - Clarify requirements for Master Database by studying necessary data input of existing application services
   - Design Master Database and its interface to onboard equipment and applications

2. Implementation and trial of Master Database
   - Prototype implementation
   - Interface between Master DB and onboard equipment
   - Interface between Master DB and application
   - Shore and onboard trials

3. Develop specifications for ship – shore information system
   - Clarify requirements for ship-shore information system
   - Prototype implementation and shore trial

4. Standardization
   - Study association with other international standards
   - Clarify scope of the ISO proposal
   - Making WD for ISO proposal

Organization



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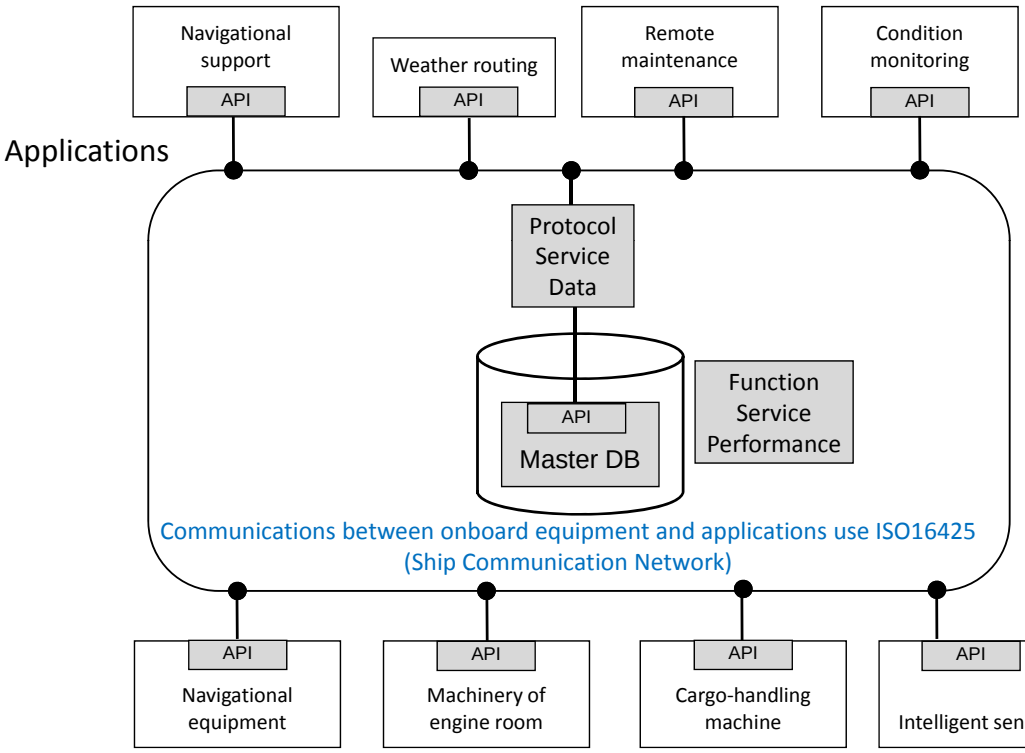
Ministry of Land, Infrastructure, Transport and Tourism

JSTRA Japan Ship Technology Research Association

Image of Master Database



Remark:
hatching blocks are standardization target

API: Application Program Interface

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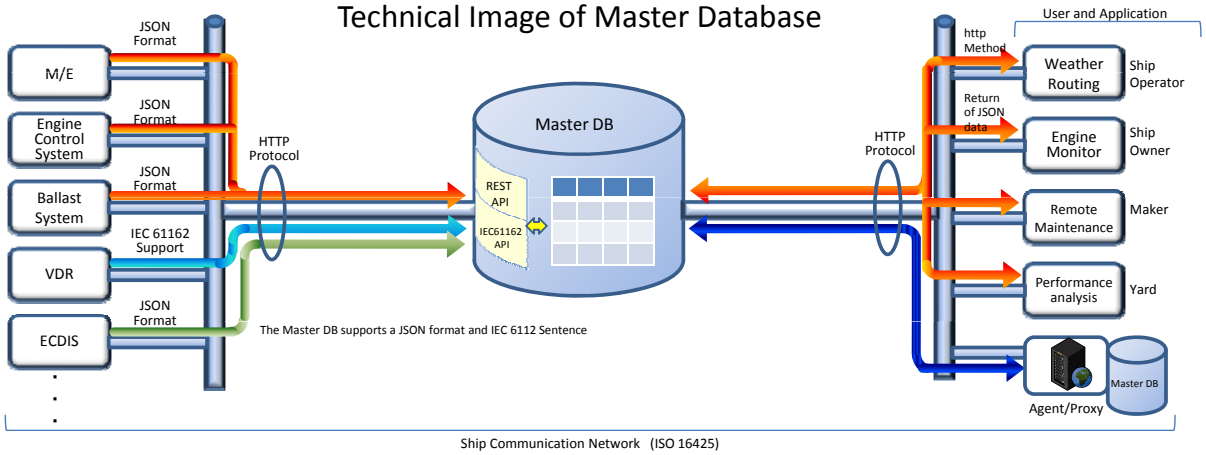
Technical Image of Master Database



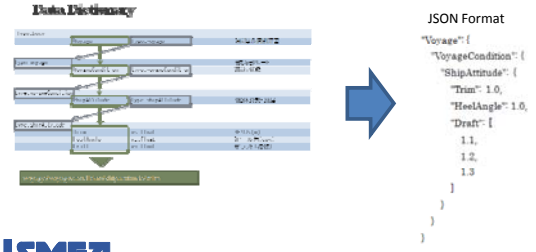
JSON Data Format

JSON (JavaScript Object Notation) is lightweight data interchange format.

The format is easy to read/write and also easy to parse/generate for machines.

The data format and dictionary will be part of ISO proposal.

The dictionary will be developed in the MasterDB Working Group.



Master DB WEB API

MasterDB supplies the functions of reading/writing the data via web API.

With this API, authorized users can access the onboard data such as navigation system or engine system without considering each specific interfaces

HTTP METHOD

- ❖ GET method (for retrieving/ browsing data saved in the MasterDB)
- ❖ PUT method (for saving data in the MasterDB)
- ❖ POST method (for adding Alarms/Events/Binary Files)

Example

GET Method
GET /machinery/mainengine/1/status/rpm
GET /voyage/voyagemeasure/speed/transwaterspeed

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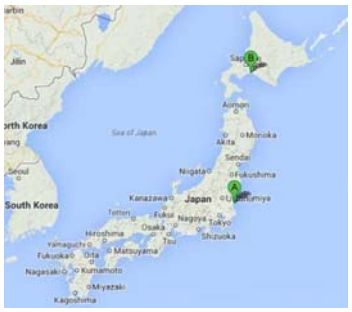
Onboard Trial - Ship (A)

- Ferry “Sunflower Shiretoko” (retro-fit)
  - Gross ton : 11,400　　Speed :25Knot
  - L :190m　B :26.4m
  - Route : Ooarai (Ibaragi prefecture)～Tomakomai(Hokkaido)

- Installation in Jan 2014



Installation on “Sunflower Shiretoko”

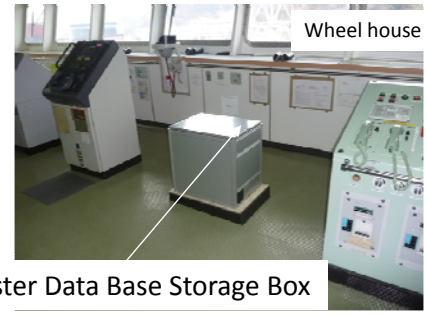
Onboard equipment

- GPS
- Anemometer
- Echo Sounder
- Auto Pilot
- Roll/Pitch sensor
- Engine Data Logger
- M/E remote control
- CPP remote control
- Shaft power meter

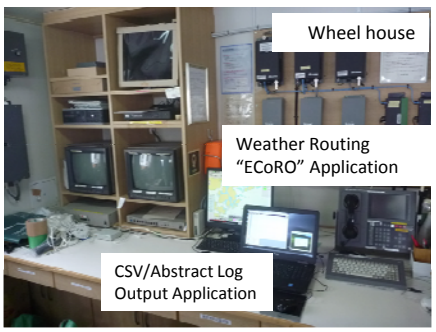
→ Master DB →

Application

- Weather routing “ECoRO”
- CSV/Abstract Log Output Application



Master Data Base Storage Box



Onboard Trial - Ship (B)

- Crude-oil Carrier “SHINKYOKUTO MARU” (New building)
- Deadweight : 5,500Ton L :105m B :16m
- Installation before sea trial
- Ship will be in service from April 2014
- Route: Onahama (Fukushima) – Hirono (Fukushima)

Installation on “Shin Kyokutomaru”

Onboard equipment

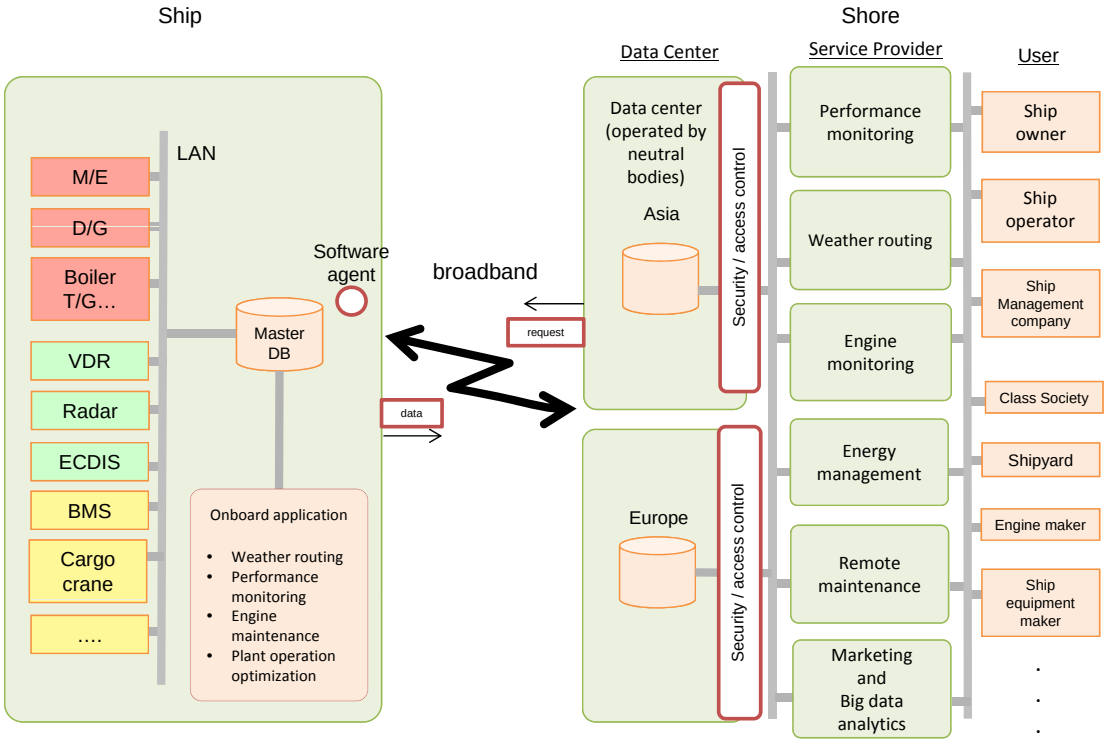
- GPS
- Anemometer
- EM log
- Gyro pilot
- Radar
- AIS
- NAVTEX
- Doppler sonar
- Cargo control system
- Engine Data Logger

Master DB

Application

- Weather routing “ECoRO”
- Engine monitor “Ship’s supporter”

Image of ship – shore big data infrastructure



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What are the benefits of such infrastructure ?

- ✓ 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

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Scope of standardization
- ship data server -

- System model
- System security
- Communication specification
- Data specification
- Data server requirement
- API requirement on equipment, application and data server

Scope of standardization
- data dictionary and format -

- Data dictionary
  - Machinery, hull and cargo
- Specification of data format(Informative annex)
  - Data structure, character of data etc.

Policy of standardization

- Corroborate and harmonize with
  - Existing standards
    - IEC61162-450(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.

Schedule for ISO proposal

- As soon as possible
  - We will register SSAP as e-Navigation testbed
- Oct. 2014
  - Presentation in TC8 annual committee(in Panama)
- Mar.2015
  - New work item proposal to ISO/TC8/SC6

Summary

- JSMEA, Class NK and 27 member organizations started SSAP (Smart Ship Application Platform) project
- Master Database and its interface was designed and prototype system was developed
- Trial implementation has been carried on 2 vessels
- Image of shore data center and ISO standardization are introduced

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Thank you very much for your attention

For further information, please contact

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