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

Image of onboard application installation (now)
Image of onboard application installation (future)

Application (onboard and shore)

- Optimum Trim
- Performance Monitoring
- Weather Routing
- Engine Monitoring
- Remote Maintenance
- Energy Efficient Autopilot

Ship Equipment LAN for Application

To Shore (broadband)

Onboard equipment

- Master DB
- Ship Equipment LAN
- ECDIS
- VDR
- Engine Data Logger
- Ballast Control System

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

All Project Member Meeting

Steering Committee
- Project Management
- Schedule Management
- Budget Management
- Intellectual Properties
- ISO Promotion
- Alliance with other projects

Project Advisory Group
- Comment
- Advice
- Proposal

Application Investigation WG
- Requirements from applications

Ship – Shore Total System WG
- Ship – shore communication
- Shore data center

Testing on Actual Ship WG
- Ship A (RoRo Ferry)
- Ship B (Tanker)
- Scheduling and planning
- Development of application I/F
- Connection with onboard equipment
- Shore trial
- Onboard trial

Master DB Development WG
- Specification of Master DB
- Development of Master DB
- Interface between Master DB and equipment

International Standardization WG
- Drafting ISO WD
- Coordination with other standards

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Image of Master Database

- Navigational support
- Weather routing
- Remote maintenance
- Condition monitoring

Applications:
- Protocol Service Data
- Function Service Performance

Communications between onboard equipment and applications use ISO16425 (Ship Communication Network)

Shipboard equipment

API for Navigational equipment, Machinery of engine room, Cargo-handling machine, Intelligent sensor

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

Remark:

- hatching blocks are standardization target

API: Application Program Interface

JSME
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Onboard Trial - Ship (A)

- Ferry “Sunflower Shiretoko” (retro-fit)
  - Gross ton: 11,400  Speed: 25 Knot
  - 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

Application
- Weather routing “ECoRO”
- CSV/Abstract Log Output Application
Onboard Trial - Ship (B)

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

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

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

Thank you very much for your attention

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