



- Slow & Silent but not Sleeping, Go steadily
- Government takes a lead since E/2017
- Paving the ground in IoT, Big Data, Platform
- Private companies/Academia are working
- For Test, start with simulation first at congested channel to Tokyo

Japan is,

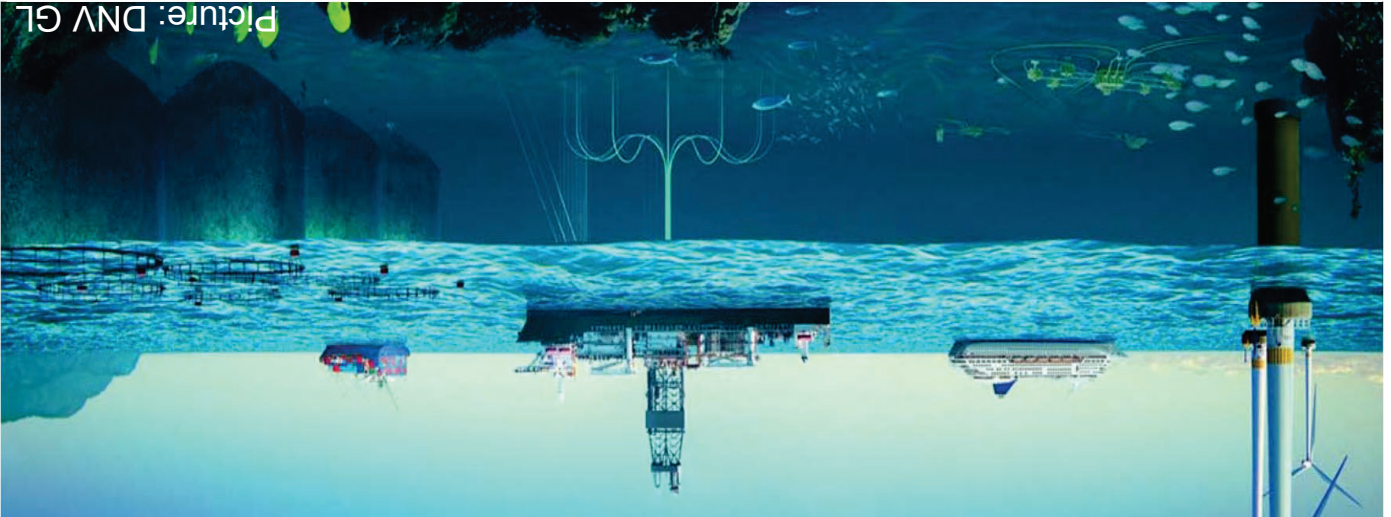
Shunichiro Namikawa

Representative, NAVIKA Consulting
November, 2018

NAVIKA Consulting



What is happening in Japan?



Picture: DNV GL

Roadmap to Realize Autonomous Ships

- Based on the technology trend, actions to take place step by step where regulations should not stop it.
- Phase II Autonomous ship may start development before 2020. To assist technical development and demonstration and applicable legislation to apply coastal vessels first. Similar measures to apply to overseas vessels, leading IMO discussion.
- Phase III Autonomous ship: Responsibility and liability etc other than technology to be investigated in middle/long term.

2025	-2025	-2025	2020
			Become common

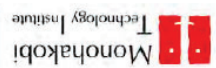
Technical development & Demonstration

- Phase I Autonomous Ship(IoT applied)
 - With onboard network, to collect data from sensors, analyze it, propose optimum routing, detect abnormal condition of Engine and communicate
- Advanced & Demonstrative development to start
- Equipment will be integrated, communicated and interacted each other.
- Advanced Data Analysis and AI technology will propose optimum operation and present information for judgement visually. Remotely operated vessel is assumed (but final decision will be made by the seafarer)
- Phase II Autonomous Ship
 - Further advanced technology and system
 - Appropriately functioning system under any traffic circumstances, weather condition and berthing/debarring. Highly autonomous and final decision is made without seafarers
- Phase III Autonomous ship
 - Demonstrations of Autonomous ship (2018~)
 - Demonstrate to identify requirements to ensure safe operation
 - In order of earlier possible and available technology
 - Reviewing the standards along with technology development

Standards and Regulations

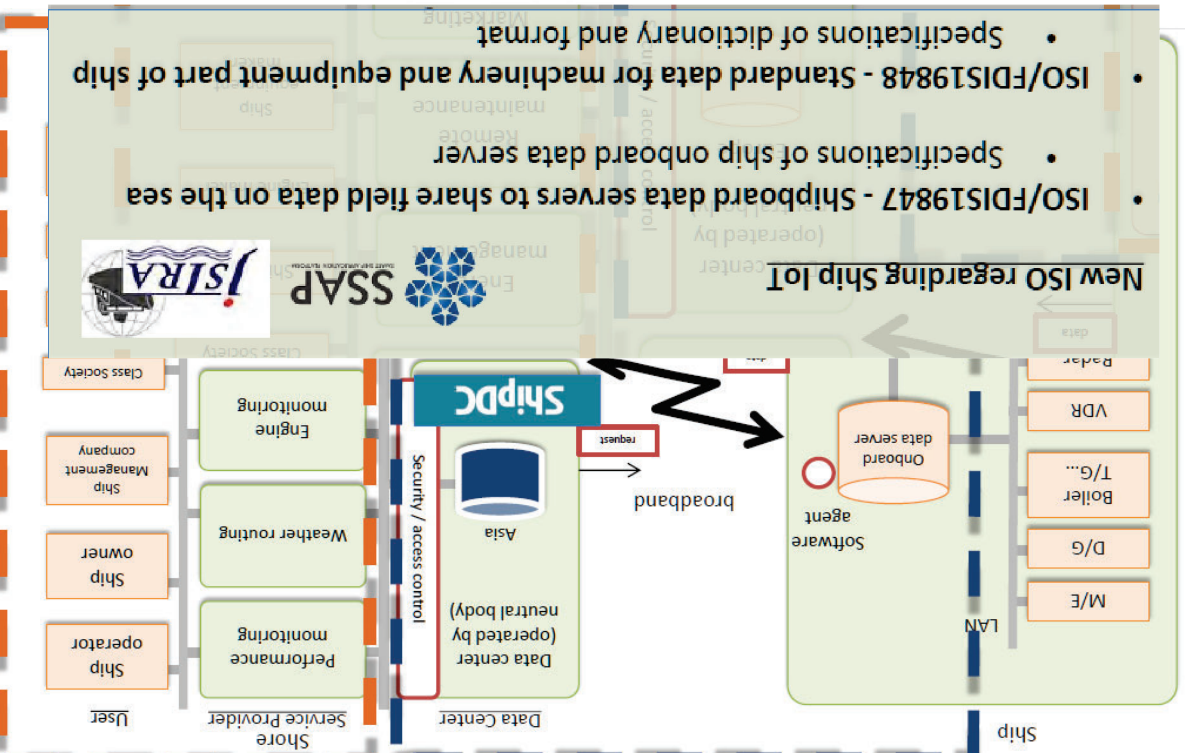
- Available measures to take place for coastal ships one by one (Investigate equipment needed for Autonomous operation of remotely controlled vessels)
- Along with Technology development and result of demonstration, investigate new training scheme for seafarers
- Corresponding Measures to Phase III Autonomous ship
 - Investigate influence to Authorization and Liability w.r.t. Ship operation
- Corresponding to Phase II Autonomous ship
 - Leading the discussion in IMO, similar measures to coastal ships may apply to overseas ships
- Screening of the regulations to revise(MSC99-102)
 - Taking into account the gradual development of Autonomy
- Revision of the Regulations
 - Prepare Guideline
 - Result of screening of (SOLAS, STCW COLREG)
 - Applicable ones without revision of regulation(i.e. equivalency or exemption)

Source: MLIT of Japanese Government
Translated by S.Namikawa (OZT Study group)



Concept of open platform for marine industry

lot Open platform (Industry standard)
Application / services (Competition)





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ありがとうございました

감사합니다
Thank you



1. OZT Study Group: Meeting 21 times, Big seminar in February 2019
Collision Avoidance Algorithm led by Prof. IMAZU
2. Kobe University and National Research Institute of Fisheries Engineering for Collision Avoidance
3. MOL & Rolls Royce co-work for Autonomous Navigation through the INLAND Sea of Japan
4. NYK, MTI, Japan Marine Science on Collision Risk Judgement and Autonomous Navigation
5. Fujitsu works for Near Miss Detection Methodology at the Singapore Strait
6. RAKUTEN (mini-AMAZON in Japan) and Maritime Robotics Norway for (maybe) delivery services and logistics including sea transportation.
7. Mitsui E&S Shipbuilding et al's comprehensive works on 1) R&D on Autonomous System Concept for Sea-Transport, 2) R&D on Autonomous Maneuver Control System, 3) Full-Scale Test of Autonomous Vessels

Private Companies and Academia