AUTONOMOUS SHIPPING:
NAVIGATING TO THE FUTURE

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Global Sustainable Transport Innovation and Knowledge Center (GSTIKC) was established in 2022 as a public institution under the Ministry of Transport of the People's Republic of China, committed to implementing the Global Development Initiatives and the UN 2030 Agenda for Sustainable Development. One of the key actions of our Center is to promote the deep integration of new technologies with the transport sector.
THE FUTURE OF MARITIME SECTOR

AUTONOMOUS SHIPPING

Potential:
Enhancing safety, reducing operational costs, alleviating seafarer shortages, and improving environmental performance and transportation efficiency

KEY DEVELOPMENT DIRECTION

- Guidance on promoting the Development of Intelligent Shipping issued by 7 ministries
- Major policy and planning documents issued by central government
PART 01
Introduction on the Pilot Projects
ELEMENTS in the development of autonomous shipping

SHIPS, PORTS, NAVIGATION, PUBLIC ADMINISTRATION, SHIPPING SERVICES.

As of October 2022, 86 ships in China have obtained the intelligent notations from CCS.

BULK CARRIER
OIL TANKERS
CONTAINERS
SCIENTIFIC RESEARCH SHIPS
DREDGING ENGINEERING SHIPS
CAR CARRIERS, TUGBOATS
AND OTHER SHIP TYPES.
"ZHIFEI"

Delivery Time  April 2022
Total length (m) 117.15
Width (m) 17.32
Mould depth (m) 9.9
Speed (kn) 12
Endurance (nm) 80

3 navigation modes: Manual, remote, autonomous

"ZHUSHAI YUN"

Delivery Time  January 2023
Total length (m) 88.5
Width (m) 6.1
Designed Draft (m) 3.7
Speed (kn) 18

Notations: i-ship (R1, No, M, I)

Carrying: Dozens of air, surface, underwater drones
INTRODUCTION OF PILOT PROJECTS

" ZHI TING 1 "
Delivery Time  November 2023
Total length (m)  17.8
Width (m)  5
Designed Draft(m)  1.17
Service Speed (kn)  16
3 navigation modes: Autonomous, semi-autonomous, manual

" INTELLIGENT TRAINING SHIP "
Delivery Time  Around April 2024
Total length (m)  69.93
Width (m)  10.9
Speed (kn)  17.5
Notations to be obtained: i-ship ( I, Nx, Mx, Ex, Hx, Rx, Ax )
Just-In-Time (JIT) Arrival

As one of the world’s largest port, Ningbo-Zhoushan port receives almost 3000 daily visits of ships. The concentration of ships during peak hours often leads to prolonged congestion, high navigation risks, and increased emissions. In response to this situation, the VTS center of Zhejiang Maritime Safety Administration of China implements an Intelligent Vessel Traffic Service Project, the Just-In-Time (JIT) Arrival of ships in Ningbo-Zhoushan port.

**Step 1 submission of application:**
The ship reports to the maritime administration on information of its route and submits JIT arrival application before its departure from last port.

**Step 2 development of port-entering plan:**
The maritime administration coordinates with the port and the ship to develop a port-entering plan for the ship to ensure ship reaches the terminal with zero waiting time.

**Step 3 arrival at Ningbo-Zhoushan Port:**
Resources be coordinated to ensure berth, fairway, nautical service are readily available to the ship on its arrival.
Just-In-Time (JIT) Arrival

As of **December 2023**
- **8682** ships adopted economic speed
- **381,000** tons of fuel saved
- **162,000** hours waiting time reduced
- **70%** accidents and near-misses reduced
- **50%** of the VHF communication reduced
Regional VTS integration network in Yangzi River Delta
Regional VTS integration network in Yangzi River Delta

YANGZI RIVER DELTA AREA

SHANGHAI

JIANGSU

ZHEJIANG
Regional VTS integration network in Yangzi River Delta
Regional VTS integration network in Yangzi River Delta
Challenges Faced by the Development of Autonomous Shipping
MULTIPLE CHALLENGES

The application of autonomous technology in the shipping field has gradually moved from conceptual design to testing and even commercial operations, but it is undeniable that the development of autonomous shipping still faces multiple challenges.
• **Technical Aspect**

Technical challenges remain to be addressed, including the accuracy and reliability of the situation awareness system, the performance of the collision avoidance decision-making system, and the accuracy and redundancy of the control system. In addition, lack of open data sources compared to the automotive industry for training the neural network model slows down the development of autonomous ships.

• **Regulatory Aspect**

The uncertainty in the application of regulations is often singled out as principal barrier. The concept of remote control and autonomous navigation will have a fundamental impact on the "human-centered" maritime legal framework including safety regulations, maritime liability and insurance.
The development of autonomous shipping requires significant capital and resource investment. The market prospects and profit model are still unclear. How to maintain the sustainability of technology research and development is one of the main issues that need to be solved.

Public acceptance of autonomous technology have not been fully established. Underlying safety issues such as system reliability, cyber security and data protection will affect users' trust of new technologies to a certain extent. And this may directly affect the uptake of autonomous shipping.
PART 03
Initiatives on Jointly Promoting the Development of Autonomous Shipping
By embracing the state-of-the-art technologies, the shipping industry will inspire new vitality and navigate to a more sustainable future.

As we continue to explore the opportunities and address the relevant challenges, communication and cooperation are essential.
Strengthen cooperation in the scientific research, promote the continuous development and deployment of advanced autonomous technology in the shipping industry. Invite countries to make use of the platform of the GSTIKC to conduct cooperation, exchanges in the area of autonomous shipping development.
Establish cooperation network of ports on “Just-in-Time” arrival within the Asia-Pacific region. Promote cooperation on data exchange between ports, improve collaboration among stakeholders including port authorities, terminals, shipping companies, service providers, improve quality and availability of data and develop necessary regional digital data standards to facilitate the data exchange.
Enhance maritime transport infrastructure, including port facilities, aids to navigation, vessel traffic service system, integrate information technologies, digitalisation, and autonomous systems into port operations to facilitate the operational adaptation of ports with autonomous ships.
THANK YOU

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