China Launches First "Intelligent" Cargo Ship

OE Watch Commentary: In November of 2018, China Ship News announced, in the accompanying excerpted article, that a Chinese company had completed and tested the world's first "intelligent" cargo ship. The ship, called Pacific Vision [明远], is a Very Large Ore Carrier, with a maximum cargo of 400,000 metric tons. The ship is over 362 meters long and 65 meters wide. For comparison, the *Vale Sohar* (pictured) is a similar 400,000-ton ore carrier.

The economic efficiency involved in bigger ships have driven cargo ships toward ever-larger sizes, with the main restrictions being those of important transit areas like the Suez and Panama canals. Despite their size, modern container ships already have a small crew complement compared to 50 years ago, with weather forecasting, automation and satellite navigation systems helping reduce the need for various crew positions. "Intelligent" ship technology aims to harness sensors and satellite navigation systems to improve safety through continuous monitoring. However, this amount of data requires deliberately-designed architectures to properly process it.

In 2017, China operated over 1000 bulk carriers—double that number if Hong Kong-registered ships are included. Remote controlled ships have been tried before, but insufficiently smart navigation and high operating costs compared to human crews meant that projects were abandoned. The new system should help improve safety and efficiency.

The article notes that the Chinese Ministry of Industry and Information Technology established a special program to develop "smart" ships, with the goal to "seize the commanding heights of ship technology development, and enhance its (Chinese ship manufacturers') international competitiveness." The *Pacific Vision's* successful 10-day trial is another step toward that goal and while its "intelligent" systems are only an incremental step, paired with more accurate and redundant navigation systems such as China's expanding Beidou-3 navigation satellite constellation, "intelligent" ships' automatic ship-to-ship communication, collision avoidance systems and sensor data fusion point toward a future where a large portion of sailing jobs such as bulk carriers, oil tankers, cargo ships are fully automated. **End OE Watch Commentary (Wood)**

"...the study of intelligent ship technology is one of the important ways for China's shipbuilding industry to adjust its industrial structure, seize the commanding heights of ship technology development, and enhance its international competitiveness..."

Vale Sohar in Nantong, China (2012).
Source: Dmitriy Lakhtikov [CC BY-SA 3.0 (https://creativecommons.org/licenses/by-sa/3.0)], https://commons.wikimedia.org/wiki/File:Vale_Sohar_in_Nantong.jpg.

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Continued: China Launches First "Intelligent" Cargo Ship

Source: He Baoxin and Qian Ping, "全球首艘智能VLOC成功试航—中国智能船舶1. 0新时代来临 (World's first Smart VLOC Successfully Completes Trial Voyage—The Era of Chinese AI Ships is Getting Closer)," *China Ship News*, 26 November 2018. http://chinashipnews.com.cn/show.php?contentid=14332

On 14 November 2018, the world's first 400,000-ton 'intelligent' Very Large Ore Carrier (VLOC) built by China State Shipbuilding Corporation's [中国船舶工业集团有限公司]*Shanghai Waiguoqiao Shipbuilding Co.* [上海外高桥造船有限公司], *successfully completed its first test voyage. Under the careful supervision of Waigaoqiao staff, the A.I. ship project team successfully overcame poor sea conditions, complicated navigation tests. After 10 days of sea trials, the ship completed its project goals. The results of the navigation test indicates that all functions of the intelligent systems met requirements. The test results were confirmed by the ship-owners, China Classification Society (CCS) and DNV GL (an international standards, registration and classification society).*

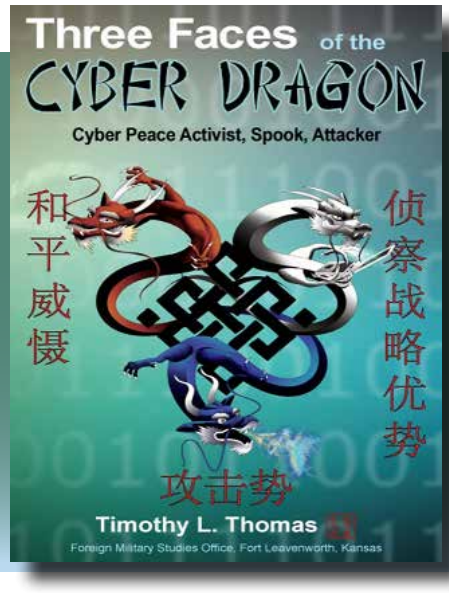
As China's first intelligent ship 1.0 R&D developmental model, the ship network platform and information platforms to achieve five modular A.I. functions including auxiliary autonomous navigation, efficient energy management, equipment operation and maintenance, ship-to-shore integrated communication, dry cargo, and liquid cargo monitoring...

In 2016, the Ministry of Industry and Information Technology set up a "Smart Ship 1.0 Special project", bringing together the ship industry's top institutions [院所], AI developers, shipbuilding groups, institutions of higher learning, and so on, work together to carry out intelligent ship research. CSSC is the project's lead organizer...

In the course of the implementation of the Intelligent Ship Project, Waigaoqiao Shipbuilding design department saw success in designing an integrated intelligent system with the ship, optimized the layout according to requirements, and completed more than 500 schematics. In response to the mismatch between domestic and foreign communication equipment, Waigaoqiao Shipbuilding design Department has organized a number of live ship and laboratory tests, focusing on the coordination of intelligent system mooring and navigation outline finishing and intelligent equipment installation etc. Because of the asymmetry of conceptual and cognitive information between the R&D personnel of intelligent system and the construction personnel of real ships, how to compile the outline suitable for the verification of real ships has become a severe test for Waigaoqiao Shipbuilding and various research units. After several rounds of research, Waigaoqiao Shipbuilding Design department finally led the implementation of the test outline that can guide production, for the actual ship intermodulation and verification of the overall promotion of the creation of good conditions...

The smart ship achieved six major breakthroughs: First, the ship demonstrated the "platform + application" concept, with a network information platform aggregating, processing and analyzing the ship's sensor information in an integrated, uniform way. This reduces redundancy and inconsistency between systems. Secondly, for the first time, the ship was able to assist with collision avoidance in the open sea and helping to solve navigational issues. The third breakthrough was in streamlined ship-to-ship communication, which paves the way for automatic collision avoidance programs. The fourth innovation involved intelligent monitoring of mineral cargoes' liquefaction (when a solid begins to act more like a liquid due to vibration). Actively monitoring the state of cargos helps resolve stability issues that may result from the ship shaking and improves the safety of navigation. The ships' fifth innovation was improvement in data transmission effectiveness through better compression of ship-to-shore transmissions. The sixth and final breakthrough for the ship was the (aforementioned) recognition by international standards organizations CSS and DNV GL.

Industry experts say that the study of intelligent ship technology is one of the important ways for China's shipbuilding industry to adjust its industrial structure, seize the commanding heights of ship technology development, and enhance its international competitiveness. "Intelligent Ship 1.0 Special" Development, will be the system to enhance China's intelligent ship design, construction, operation, maintenance, management and other aspects of the ability, as well as the core products of the independent, safe and controllable capabilities. At the same time, taking bulk carriers and oil tankers as application carriers, the research on related intelligent function modules and systems will lead to the coordinated development of the whole industrial chain and enhance the comprehensive competitiveness of China's shipbuilding industry.



China's cyber policy appears to have three vectors —peace activist, espionage activist, and attack planner— that dominate China's cyber policy. Some are always hidden from view while others are demonstrated daily. Three Faces of the Cyber Dragon is divided into sections that coincide with these vectors.

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