Sayı : 38591462-730.06.01-2021-2622 28.09.2021
Konu : Rusya Federasyonu MARINET Birliği Otonom ve Uzaktan Kontrollü Gemi Yönetimi Projesi

Sirküler No: 1017

Sayın Üyemiz,

Rusya Federasyonu (RF) Türkiye Ticaret Mümessilliği İstanbul Şubesinden Sayın Aleksei NIKIFOROV tarafından 28 Ağustos 2021 tarihinde Odamıza gerçekleştirilen ziyaret ile RF'da faaliyet gösteren Yüksek Deniz Teknolojileri Birliği (Maritime High Tech Association-MARINET) tarafından gerçekleştirilen "Otonom ve Uzaktan Kontrollü Gemi Yönetimi Projesi (Autonomous and Remote Navigation Trial Project-ARNTP)" konusunda bilgilendirme yapılmış,

Müteakiben proje hakkında detaylı bilgi almak maksadıyla 13.09.2021 tarihinde MARINET Yönetim Kurulu Başkanı Sayın Alexander PINSKIY ve MARINET Çalışma Grubu Sekreteri Sayın Maxim BARKASOV ile Odamız tarafından bir çevrimiçi proje tanıtım toplantısı gerçekleştirilmiştir.

Detayları Ek'te yer alan broşürde sunulan projenin, öncelikli hedefleri arasında uzaktan kontrol sistemleri ile yönetilen gemilerdeki personel sayısının azaltılarak seyir güvenliği ve verimliliğin artırılması olduğu, Türkiye'nin bölgesinde gemi inşa sektöründeki yükselen trendiyle öncü ülkelerden biri oluşunun otonom/uzaktan kontrollü gemi sistemlerinin kurulumu ve uygulanabilirliği açısından avantaj sağlayabilecek bir pazar imkânı sunabileceği ve iş birliği imkanlarının araştırılmasını amaçladıkları ifade edilmiştir.

Bu kapsamda, Türk gemi inşa ve bakım onarım sektörünün yeni gemi inşa ve retrofit imkanları dahilinde otonom sistemlerin kurulum ve Türk deniz ticaret filosunda da otonom sistemlerin denenmesi konusunda işbirliği hususlarının değerlendirilmesi maksadıyla MARINET Çalışma Grubu Sekreteri Sayın Maxim BARKASOV ile (Barkasov.MS@ntifund.rvc.ru) (info@marinet.org) e-posta adresleri üzerinden iletişime geçilebileceği hususunu bilgilerinize arz/rica ederim.

Saygılarımla,

İsmet SALİHOĞLU
Genel Sekreter

Ek:MARINET Birliği Otonom ve Uzaktan Kontrollü Gemi Yönetimi Projesi Tanıtım Broşürü (13 sayfa)

Dağıtım:
Gereği:
- Tüm Üyeler (WEB sayfası ve e-posta ile)
- İMEAK DTO Şube ve Temsilcilikleri
- Türk Armatörler Birliği
- S.S. Gemi Armatörleri Motorlu Taşıyıcılar Kooperatifi
- GİSBİR (Türkiye Gemi İnşa Sanayicileri Birliği Derneği)
- Gemi, Yat ve Hizmetleri İhracatçıları Birliği
- VDAD (Vapur Donatanları ve Acenteleri Derneği)
- KOSDER (Koster Armatörleri ve İşletmecileri Derneği)
- ROFED (Kabotaj Hattı Ro-Ro ve Feribot İşletmecileri Derneği)
- Yalova Altınova Tersane Girişimcileri San.ve Tic.A.Ş.

Bilgi:
- Piri Reis Üniversitesi
- Yönetim Kurulu Başkan ve Üyeleri

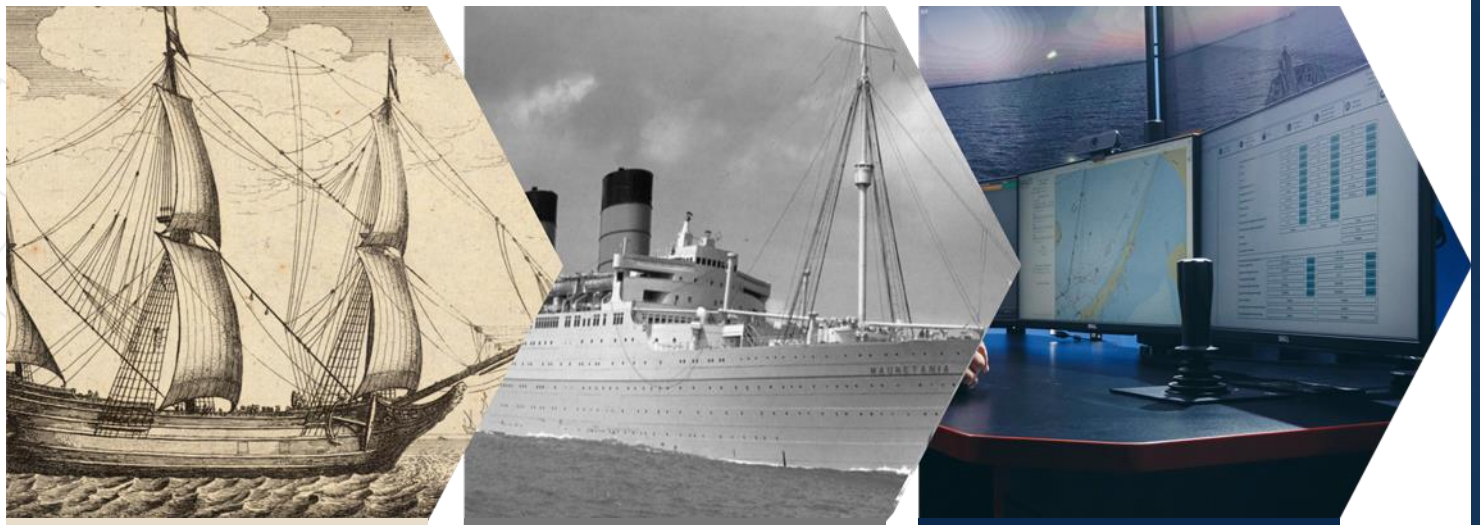
Autonomous navigation

A-NAVIGATION

Alexander Pinskiy

Autonomous Navigation Promotion Center MARINET RUT

Maritime technology revolutions change the global landscape



15th-18th cent.
New maritime technologies opened the Age of Discovery and provided dominance of European civilization in the world.

19th-20th cent.
Modern merchant ships dropped the shipping costs and opened age of the global economy. About 90% of all goods are transported by seas.

21st cent.
Autonomous (remotely and automatically controlled) vessels, will dramatically change the industry model itself and the global logistics.

In 2021, Russia the first in the world has begun the wide operation of autonomous ships by creating the necessary legal and technical conditions

- **Increasing the safety of navigation.** The human factor remains the main cause of incidents at sea. According to Allianz Global Corporate & Specialty AG, the cost of losses in shipping due to human errors in 2017 amounted to US$1.6 billion (Allianz Global Corporate & Specialty SE's "Safety and shipping review", 2018).
- **Reduction of onboard crew number.** The direct costs of shipping companies for the crew on board, including ensuring its life and safety, needs on board, are estimated as average 30-40% of ship operation costs.
- **Improving personnel policy**. In accordance with IMO analysis, there is 20% deficit of qualified officers of the global merchant fleet and this gap is growing due to hard conditions of work at sea.
- **Better transport safety control.** Permanent and real-time control allows to prevent and to react immediately on cases of illegal traffic, piracy, poaching and violations of environmental legislation

Our approach: technology and legislation

In 2019 the group of technology and shipping companies joined efforts to make possible wide practical operation of autonomous navigation in the maritime transport in the nearest future.

The strategic goal of the project is to develop and to implement technical and legal conditions for wide MASS trial operation by any shipping company starting from 2021.

Our approach is based on the principle of Comprehensive Functional Equivalence which implies the strict fulfillment in automatic and remote mode of those functions that are now prescribed to be performed by a human on board as per current global safety regulations.

Mikhail Ulyanov by SCF Barents Sea (Arctic)

Pola Anfisa by Pola Group Azov and Black Seas

Rabochaya by Rosmorport Black Sea

Complete Functional Equivalence

Legislation for commercial operation of autonomous ships

Standard set of technical solutions allowing to upgrade any vessel to autonomous

Trial operation in real conditions on different types of ships in various regions

Wide operation of autonomous vessels under the Russian flag from 2021

Principle of Complete Functional Equivalence

The principle of CFE implies fulfillment in automatic and remote modes of those functions that are now prescribed to be performed by a human on board as per current international safety regulations: STCW, SOLAS, COLREGS.

This therefore guarantees that MASS, when interacting with other actors, will be guided by and perform well-known and mandatory for functions. This makes MASS operation predictable and understandable for everyone, removing fears of unpredictable AI systems. At the same time, it also allows for MASS operation to fit within the existing framework of international regulation as is, without requiring any immediate change pre-implementation.

As a ground we used a set of functions in line with the standards of competence of crew members set out in Chapter II of Part A of the **STCW Code**.

VOYAGE PLANNING	Taking into account any factor, including economic and logistic factors, weather conditions, etc. with possible use of decision support systems
ANALYSIS OF THE ENVIRONMENTAL SITUATION	Use of charts and navigation equipment information
	Vessel position determination and keeping the route
	Permanent observation of environment situation, identification of dangers
	Logging of the events and actions during the watch
SHIP MANOEUVRING	Steering the ship
	Controlling the engine
	Ship manoeuvring to keep the route, avoid collisions or other dangers
	Ship manoeuvring in extremely difficult conditions
TECHNICAL AND ENGINEERING CONTROL	Ship engine and technical systems control
	Checking the operation of navigation and signal lights
	Hull, ship rooms and cargo inspection
COMMUNICATION WITH OTHER ACTORS (remote control only)	Using the ship's messaging system
	Radio communication
	Ship loudspeaker use
	Using visual and sound signals
PERFORMANCE OF FUNCTIONS RELATED TO INTERACTION WITH HUMANS AND NON-AUTOMATED MEANS	Crew management and care for people on board
	Search and rescue operations
	Respond to emergencies
	Mooring operations (require additional systems)

Available in the complete automatic mode

Available with limitation (remote operator or additional systems)

Currently prescribed for human only

Submission to IMO MSC 103/5/12, 16 March 2021

Legal framework for a-Navigation

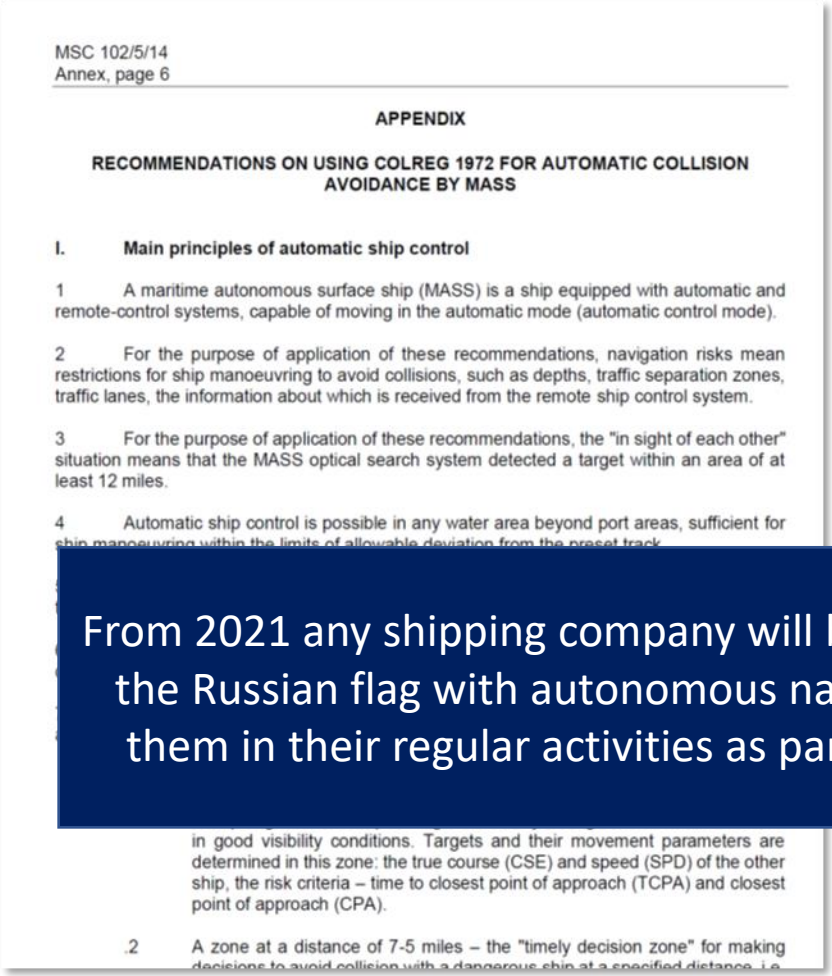
Based on the current international maritime law and results of the RSE provided by IMO Maritime Safety Committee and IMO Legal Committee the proper national MASS regulation has been developed in Russia.

In January 2021 Federal Agency for Maritime and River Transport has issued Guidelines for COLREG-72 application for MASS, interpreting the existing provisions of COLREG-72 in a determined way which allows to define the scenarios (algorithms) of MASS movements in a every given situation, as well as the limits for the use.

The proper interpretation of SOLAS provisions by the State Flag administration is provided in the Federal Law. Also in December 2020 the Government of Russia approved the national experiment on wide MASS trial operation based on Interim Guidelines for MASS trials adopted by the Circular MSC.1/Circ.1604.

MSC 102/5/14, 11 February 2020, MSC 103/5/7-8, 16 March 2021

COLREG



MSC 102/5/14
Annex, page 6

APPENDIX

RECOMMENDATIONS ON USING COLREG 1972 FOR AUTOMATIC COLLISION AVOIDANCE BY MASS

I. Main principles of automatic ship control

1 A maritime autonomous surface ship (MASS) is a ship equipped with automatic and remote-control systems, capable of moving in the automatic mode (automatic control mode).

2 For the purpose of application of these recommendations, navigation risks mean restrictions for ship manoeuvring to avoid collisions, such as depths, traffic separation zones, traffic lanes, the information about which is received from the remote ship control system.

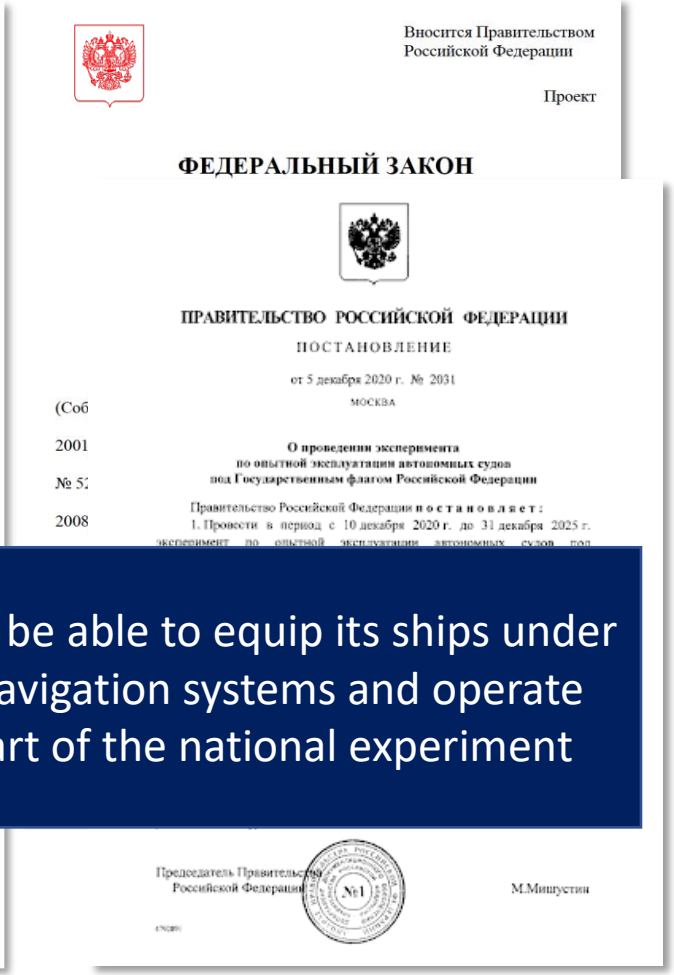
3 For the purpose of application of these recommendations, the "in sight of each other" situation means that the MASS optical search system detected a target within an area of at least 12 miles.

4 Automatic ship control is possible in any water area beyond port areas, sufficient for

in good visibility conditions. Targets and their movement parameters are determined in this zone: the true course (CSE) and speed (SPD) of the other ship, the risk criteria – time to closest point of approach (TCPA) and closest point of approach (CPA).

.2 A zone at a distance of 7-5 miles – the "timely decision zone" for making

SOLAS, IG for MASS Trials



Вносится Правительством Российской Федерации

Проект

ФЕДЕРАЛЬНЫЙ ЗАКОН

ПРАВИТЕЛЬСТВО РОССИЙСКОЙ ФЕДЕРАЦИИ

ПОСТАНОВЛЕНИЕ

от 5 декабря 2020 г. № 2031

МОСКВА

О проведении эксперимента по опытной эксплуатации автономных судов под Государственным флагом Российской Федерации

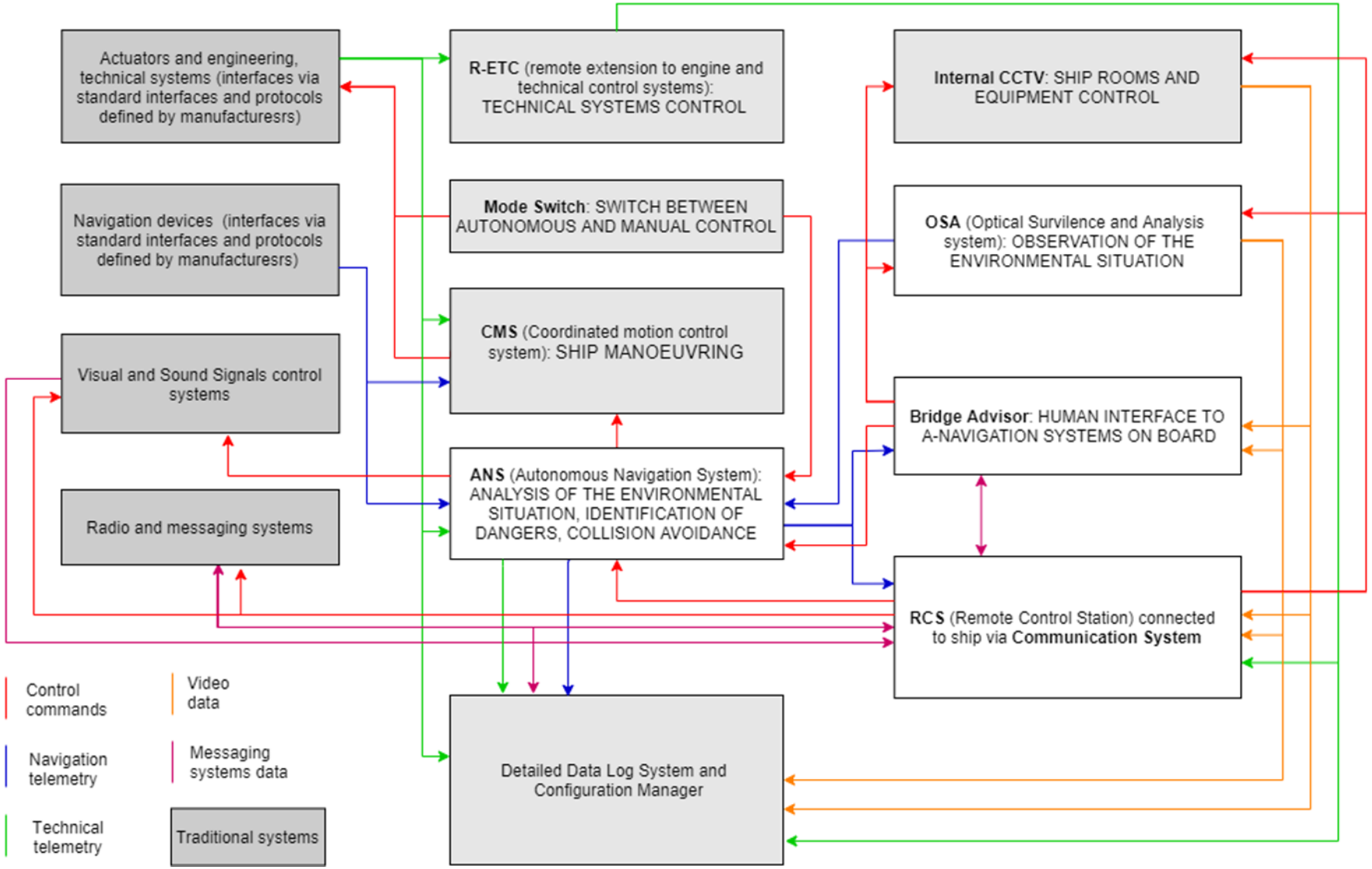
Правительство Российской Федерации п о с т а н о в л я е т :

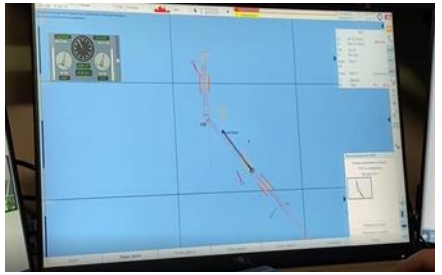
1. Провести в период с 10 декабря 2020 г. до 31 декабря 2025 г.

Председатель Правительства Российской Федерации М.Мишустин

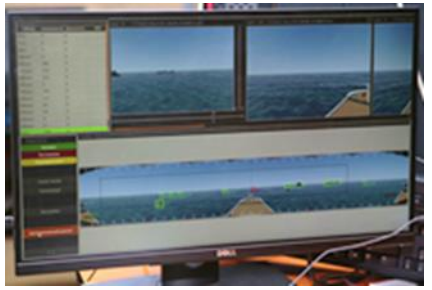
From 2021 any shipping company will be able to equip its ships under the Russian flag with autonomous navigation systems and operate them in their regular activities as part of the national experiment

System Architecture

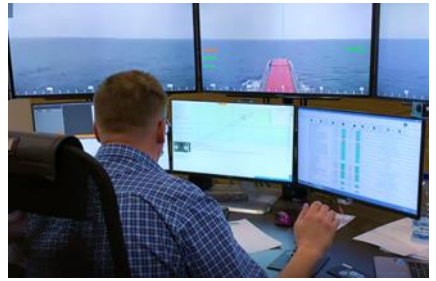




Autonomous Navigation System

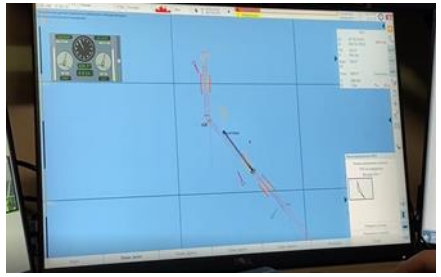


Optical Surveillance and Analysis System



Remote Control Station

Autonomous Navigation System



ANS performs the functions of automatic analysis of the environment, the passage along a given route (in automatic mode and remote control mode), offering automatic decision-making on maneuvering while taking into account the parameters of the vessel and COLREGs-72 provisions. ANS includes Sensor Fusion Module (SFM), Automatic Collision Avoidance Module (ACAM) and ANS Client (representing extended functionality of ECDIS).

The Sensor Fusion Module (SFM) integrates, synchronises and validates navigational data from different sources such as the radar, AIS, positioning, compass, weather station, etc, and the optical system OSA. This is similar to an officer onboard who has to gather data from all of these navigational devices, his eyes and integrate it into a single picture in his mind.

The Automatic Collision Avoidance Module (ACAM) keeps to the route and calculates the maneuvers of the vessel to avoid collisions with other vessels and navigational hazards in accordance with rules determined by COLREGs-72. These detailed rules are provided as per clear official recommendations from the Russian Federal Agency for Marine Transport for automatic collision avoidance systems. Strictly determined algorithms of this nature make MASS 100% predictable, even when placed in comparison with a traditionally crewed ship.

The ANS Client integrates all the data from mandatory and additional electronic charts (such as ICE or SAT images) and any other available information, and presents it via human interfaces that are similar to ECDIS.

Optical Surveillance and Analysis System

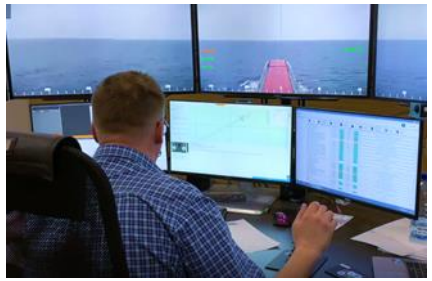
The Optical Surveillance and Analysis System (OSA) is an optical system that detects and recognises surrounding objects. It transmits this data in a machine-readable form to the ANS while also sending the processed video image to human interfaces (such as the Remote Control Station and Bridge Advisor).

The OSA resolves the challenging task of fulfilling conventional requirements of providing visual observation in a completely autonomous mode while sitting in parallel to human-operated remote mode. Although we are only beginning the process of training the OSA neural network to reliably recognise any objects in different conditions at this current time, we believe that this automated approach that does not rely on human-operated remote controls will pay off in the future. This therefore goes a step further than simply moving human operation and oversight from onboard to shore.

At the same time, the OSA allows us to improve the quality of situational awareness for humans, both on board and in the RCS. Augmented reality (an image with additional indicative information) and even completely virtual models (in case of poor visibility or problems with the communication channel between the remote control and the vessel) may well become common everyday tools of navigators in the near future.

Internal CCTV provides various tasks like indoor video recording, automatic control over the condition of rooms (movement, change of geometric parameters, etc), equipment (change of indication, switch states, etc), cargo (displacement, crumbling, tilt and other parameters), and the transmission of this video information to HI.

Remote Control Station



The Remote Control Station (RCS) is a workstation for a remote control operator and is designed to solve the entire range of remote monitoring and control tasks. It is located outside the controlled vessel and is the equivalent of a highly ergonomic ship's bridge and a central control station.

RCS includes interfaces for the operator's interaction with ANS, OSA, R-ETC, a joystick system for vessel motion control, and a set of terminals to the conventional radio equipment and loudspeakers onboard a controlled MASS:

• In the RCS main area there are multifunctional touch screens for interacting with all of the above systems, as well as a joystick system, terminals for interacting with the mandatory ship's communications and messaging equipment, and a video camera for video communication with the crew on board.

• Above the main area there are five screens that display image information received from the OSA about the current environment. They are present by default and display a viewing angle of 180° in front of the vessel, while including the possibility of an arbitrary rotation of this field of view by the operator using the OSA interface for viewing along a 360° arc in the horizontal plane. This arrangement offers genuine angular dimensions of any object in the image displayed for remote control operator.

• The joystick system transmits the vessel's motion parameters provided by the operator when in remote control mode to the ANS. It includes a control panel and an analog 3-axis joystick that has settings for longitudinal force, lateral force and turning moment. Using the joystick allows the human agent to operate all the necessary actuators at once with a single control.

• In order to ensure interaction with mandatory radio stations, ship MF-HF radiotelex, Inmarsat station and Navtex receiver, the RCS is equipped either by separate terminals connected to the corresponding devices onboard or by a single multichannel radio equipment control panel with a single switching module onboard.

a-Navigation Trial Project Timeline

March 2019 – August 2019	Development of methodology and solutions prototypes
July 2019 – February 2020	Risk assessment and draft legislation development
December 2019 – March 2020	Manufacturing of experimental equipment
May - September 2020	Installation on board four ships
June – August 2020	Preliminary tests of systems on shore using simulators
from September 2020	Collection of field data from ships and analysis of systems operation without possibility to control the ships
December 2020	Approval in Principle by Russian Maritime Register of Shipping
from February 2021 We are here	Tests of automated and remote operation of ships in real conditions under control of the crew
September 2021	Demonstrational voyages in real commercial operation
October 2021	MASS national regulation adoption

The national experiment on wide MASS operation
(on May 2021, five companies intended to equip 27 vessels)

Trial operation in real conditions

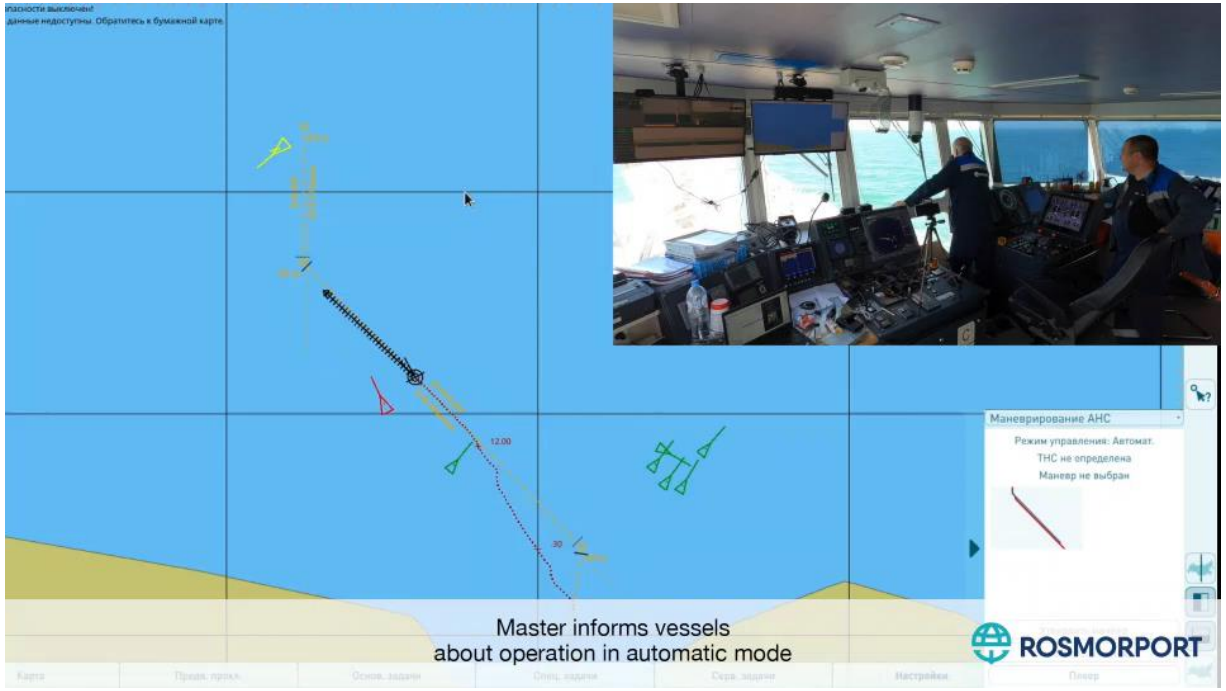
Pola Anfisa

Rabochaya

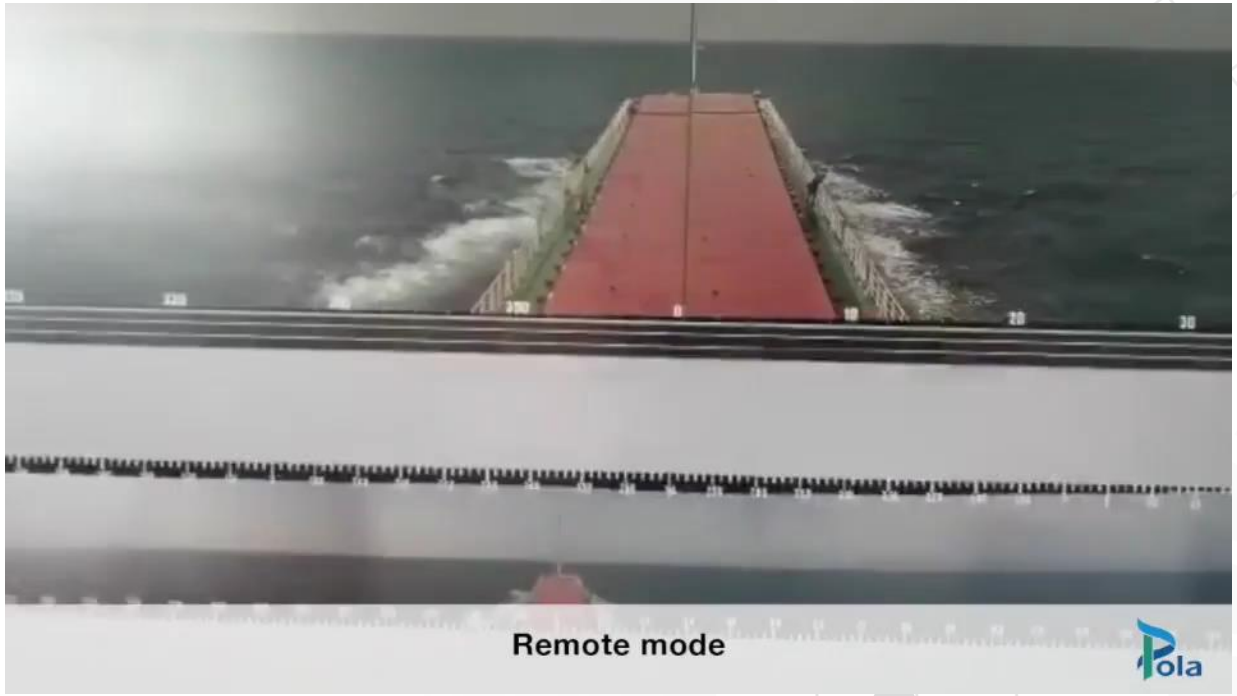
Mikhail Ulyanov

Examples of trial navigation

Example of trial operation in heavy traffic area onboard Rabochaya и Redut



Example of trial operation in high seas onboard Pola Anfisa



Symbiosis of ship control modes,

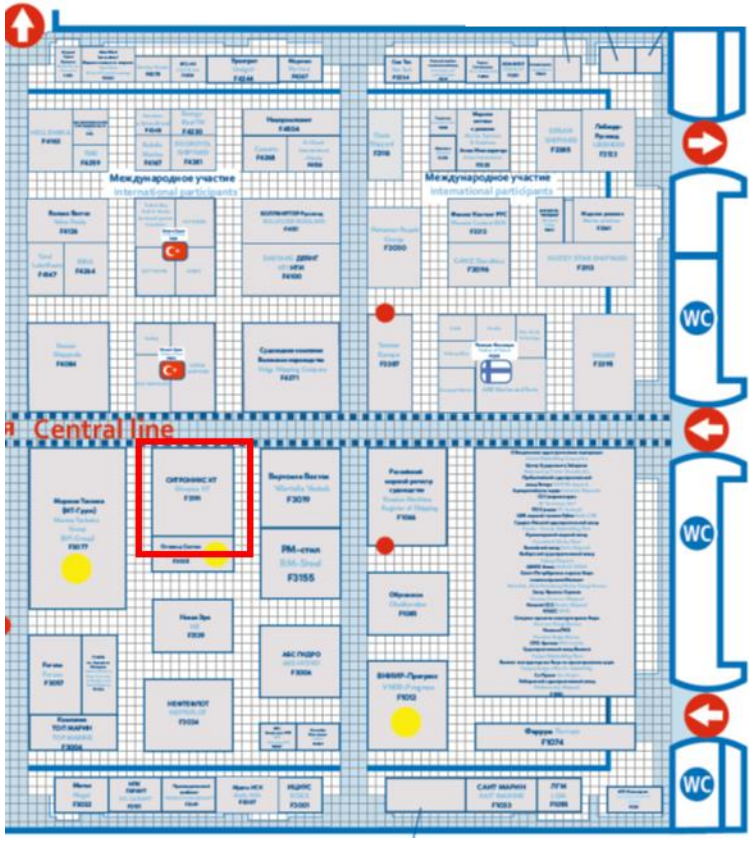
which could be combined on the same ship and during the same voyage: e.g., fully automatic navigation on a passage in the high seas (80-90% of the time); non-standard situations – by the remote operator; and only in some limited cases – like pilotage or emergency cases – we need human control onboard.

Join efforts in the a-Navigation development

We have opened up the practical operation of maritime autonomous vessels in Russia and want to spread this approach for other countries, that will provide exceptional opportunities to improve the safety and efficiency of the entire global maritime transport industry.

We are ready to share our technical and regulatory solutions as well as our practical experience to avoid the inevitable mistakes and to benefit of being the first in autonomous navigation.

SEPTEMBER 21-24
ST. PETERSBURG RUSSIA
NEVA 2021



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23.09.21 at 14:00

A-Navigation trial project in Turkey

- Trial operation on one of selected vessels in real conditions
- Arrangement of approval by a proper classification society
- Support of the national MASS regulation development

Technical and legal conditions for MASS operation

Be one of the first in the world in autonomous fleet development!

www.a-nav.org
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Thank you!