2ND DECARBONIZING SHIPPING VIRTUAL FORUM

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GATERS – Gate Rudder System as a Retrofit for the Next Generation Propulsion and Steering of Ships

By

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What is A GATE RUDDER SYSTEM (GRS) ?

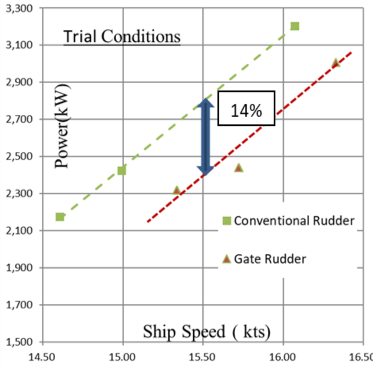
- Classical single-rudder behind the propeller arrangement is replaced by twin-rudder blades with asymmetric cross-sections which are positioned either side of the propeller

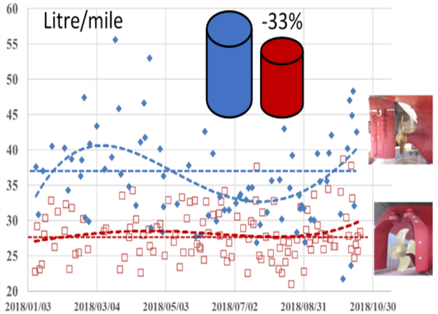
- The Gate Rudder System, therefore, takes advantage of additional thrust generated by the two rudder blades, in contrast to the additional resistance resulted by the conventional rudder

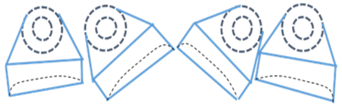
- Each rudder blade can be controlled individually to affect the direction of the propeller's slipstream (i.e. to vector) and hence to steer the vessel with increased manoeuvring and motion control capability.

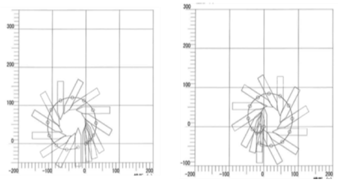
What are the advantages of A GATE RUDDER SYSTEM (GRS) ?

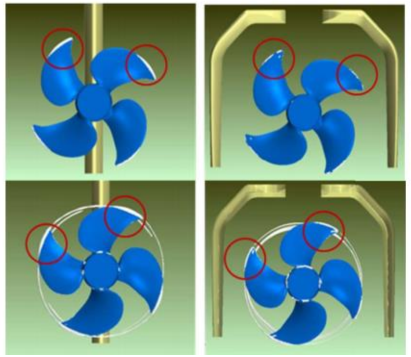
- Remarkable fuel saving (up to 14% in trials), especially in-service and rough weather (up to 30%)
- Reduced vessel motions (in yawing and rolling) in waves
- Improved steerability and manoeuvring (especially in harbours) without stern thrusters
- Reduced propeller loading and hence less vibration and URN
- Low wash wake due to hull waves & propeller slipstream
- Shorter ship length or more space at aft compared to the vessel with a conventional rudder behind the propeller
- Effective use of the bow thrusters at higher ship speeds
- Reduced risk of running anchor

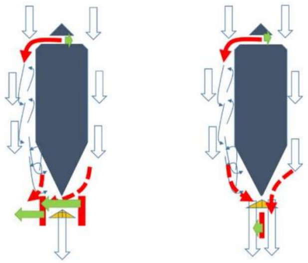


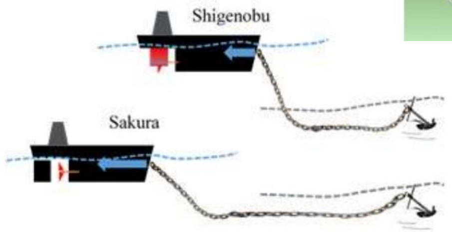












A brief history of GATE RUDDER SYSTEM (GRS)

- GRS had its origin in “**Frame Rudder**” proposed and tested by *Mr Sadamoto Kuribayashi* of Kuribayashi Steam Co Ltd, Japan in 2011.

- Frame Rudder was tested and further improved by R&D conducted in NMRI of Japan by *Dr Noriyuki* Sasaki and this led to the 1st (Japanese) patent for the early version of GRS with a single rudder stock [# JP 2014-73815 A]

- Further R&D work in Japan and the UK at the Newcastle and Strathclyde Universities led by Dr Sasaki as the Visiting Professor resulted in the current shape of the GRS with two separate rudder stocks and the 2nd (European) Patent [# EP 3103715 A1]

- GRS was first applied on a 400TEU Japanese Container vessel “**Shigenobu**” through the R&D project sponsored by Nippon Foundation and a Japanese Consortium in 2017. The comparison of performance with her sister ship “**Sakura**” was well above the predictions.

First GRS application in Japan

- First application of the GRS was on a new build 400TEU Container vessel SHIGENOBU in 2017

- SHIGENOBU is the sister ship of SAKURA with the same size and engine power but with conventional (flap) rudder built in 2016

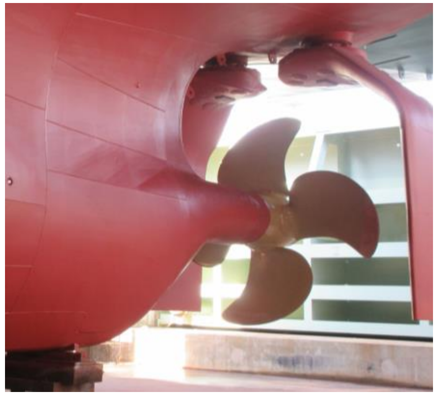
- As part of an R&D programme sponsored by Nippon Foundation and the Japanese Consortium the performance of both vessels were compared in speed trials in 2017 and later on through continuous performance monitoring in-service

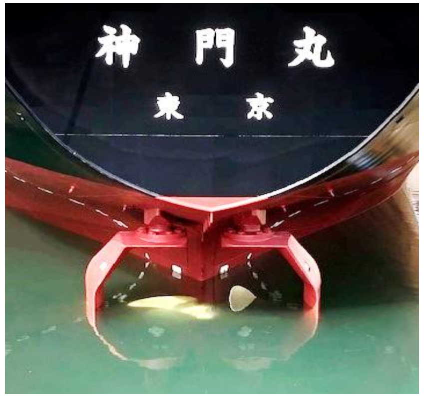
SHIGENOBU			
Length overall	L_{OA}	(m)	111.40
Length between perpendiculars	L_{BP}	(m)	
Breadth	B	(m)	17.80
Draught (midship)	T	(m)	5.24
Displacement	Δ	(ton)	
Service Speed	V_S	knots	15.5
Rudder			GR

SAKURA			
Length overall	L_{OA}	(m)	111.4
Length between perpendiculars	L_{BP}	(m)	
Breadth	B	(m)	17.8
Draught (midship)	T	(m)	5.24
Displacement	Δ	(ton)	
Service Speed	V_S	knots	15.5
Rudder			CR

So far, GRS APPLICATIONS

	SHIGENOBU (1st Application, 2017)	KOHSIN MARU (2nd Application, 2020)	SHINMON MARU (3rd Application, 2020)
Type of ship	Container (400 TEU)	General cargo (509 GT)	General Cargo (499 GT)
Lpp	101.9	69	72
B	17.8	12	12
T	5.24	4.11	4.13
C_B	0.67	0.70	0.70
Design Vs	14.5	13	13
Fn (Lpp)	0.2436	0.267	0.267
L/B	5.72	5.75	5.75
Stern shape	V shape	Stern bulb	V shape





Current commercial status of GRS

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- A Japanese Consortium (JC) involving Kay Seven Co., Ltd., (Kuribayashi Steam Co Ltd); Mr. Noriyuki Sasaki, National Institute of Maritime, Port and Aviation Technology, Yamanaka Shipbuilding Co., Ltd. and Kamome Propeller Co., Ltd owns the Gate Rudder Patent **(European Patent: EP 3103715)**

- Further R&D and promotion activities in the University of Strathclyde (Glasgow) and Visiting Prof Noriyuki Sasaki attracted Wartsila Propulsion to purchase the commercial license from the JC to use the Gate Rudder technology protected by the Licensed Patent in 2020

- GATERS Project funding was granted by the EC (H2020) in December 2019 and the GATERS Consortium signed sub-license agreement with Wartsila Netherlands BV in 2021 on behalf of the Patent Holders hence:

  "GATERS has an official sub-licence agreement with Wartsila Netherlands BV to utilise the Gate Rudder Patent (EP 3103715) at specific retrofit projects of vessels sizes below 15,000. DWT. GATERS is sponsored by the EC H2020 Programme (ID: 860337) with the aims and objectives independent of Wartsila Netherlands BV"

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(54) STEERING DEVICE, AND STEERING METHOD THEREFOR

(57) [Object]
To provide a steering device having its rudders not positioned in a propeller slipstream when the rudders are not deflected, which can provide a quiet rudder system, and can be utilized in stopping of a ship, while attaining a high propulsive efficiency and reduced CO_2 emission as well as maintaining turning performance even at a low vessel speed.
[Solving means]
A steering device in which a rudder plate is vertically suspended at a positive minimum distance α from an outer edge of a propeller having a radius R from a steering shaft which is biaxially arranged and symmetrically rotates around a screw shaft within a propeller radius R from a screw shaft center, on a propeller rotation plane, and can be turned from aside of a propeller to a downstream of the propeller by rotation of the steering shafts, each of which is driven independently by two hydraulic driving mechanisms, and
the steering device is characterized in that the steering action is divided into two modes: the two-independent mode and the two-same direction modes, and each mode is adapted as follows: at the time of ahead condition, each one of the two rudder plates is retained on both sides of a propeller parallel with a ship axis, and at the time of veering of the two-same direction mode, a rudder plate opposite to a veering direction turns 45° from aside of the propeller to the downstream of the propeller, and the other rudder plate turns -45° from aside of the propeller to the upstream of the propeller, and at the time of veering of the two-independent mode, the rudder plate opposite to a veering direction turns 45° from aside of the propeller to the downstream of the propeller, and simultaneously, the other rudder plate turns from aside of the propeller to the upstream of the propeller to take a rudder angle of 90° or more, to generate a thrust flow, and a method for steering the same to enhance a thrust flow by increase in a propeller rate.

EP 3 103 715 A1

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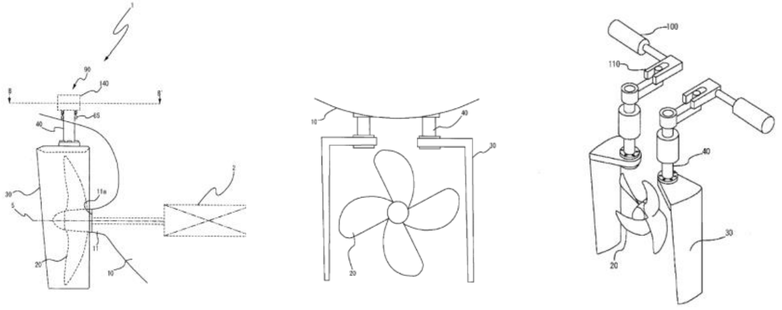
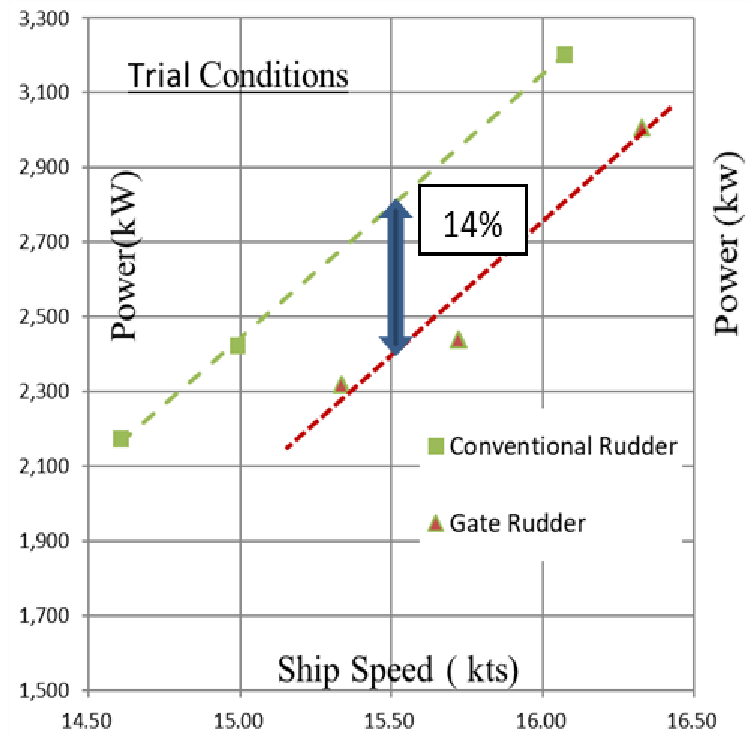
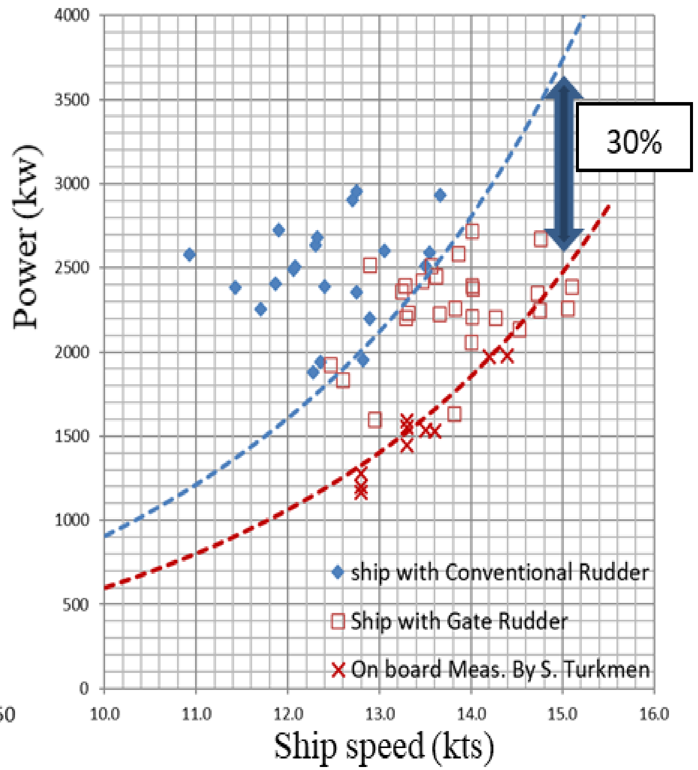
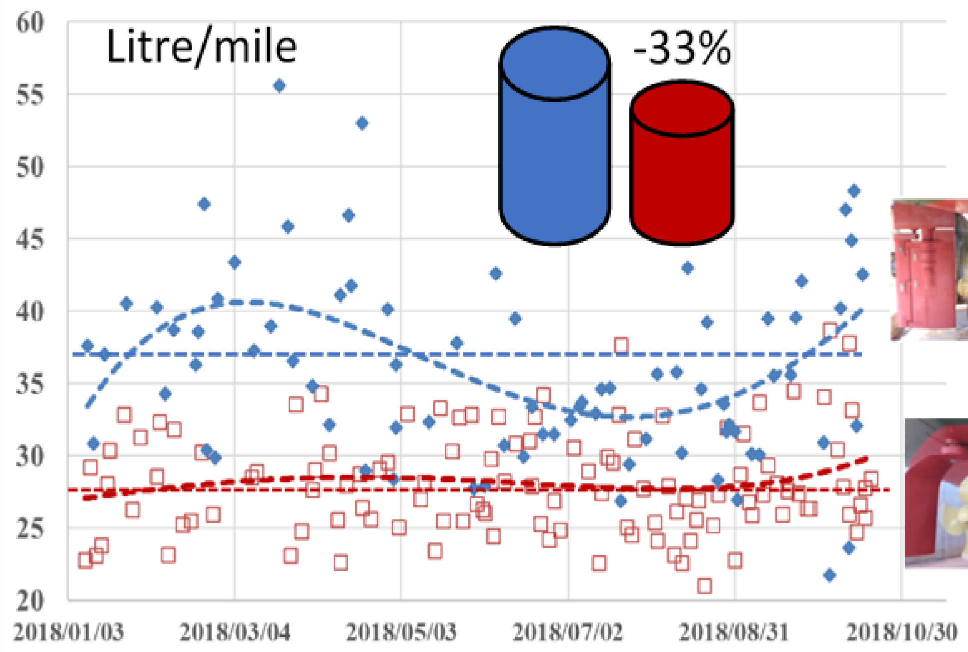


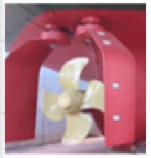
Fuel saving advantage of GRS





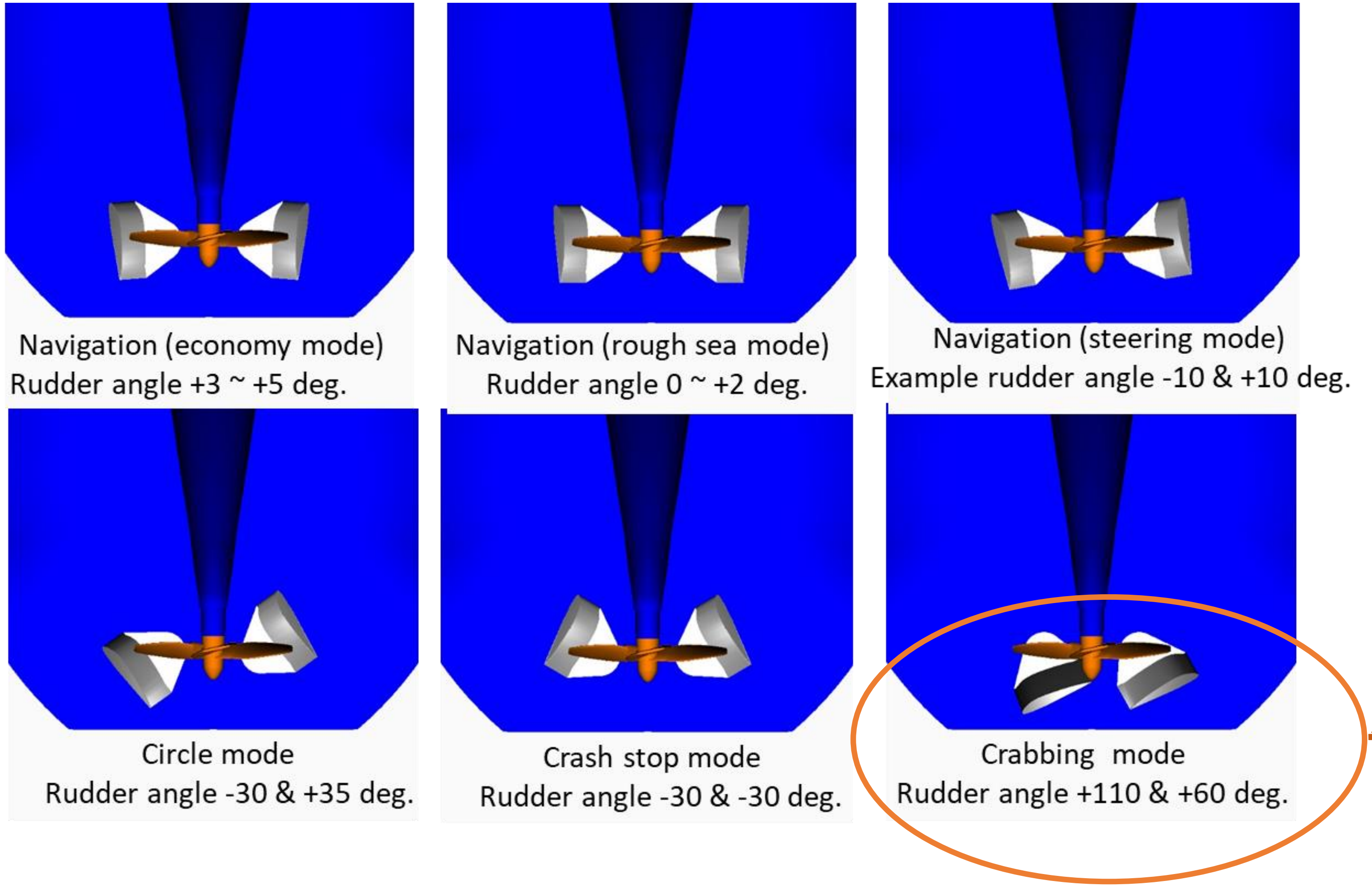
Trials (calm water) and in-service (including rough weather) powering performance comparisons of two sister ships: one with Gate rudder system, other with Conventional flap-rudder system



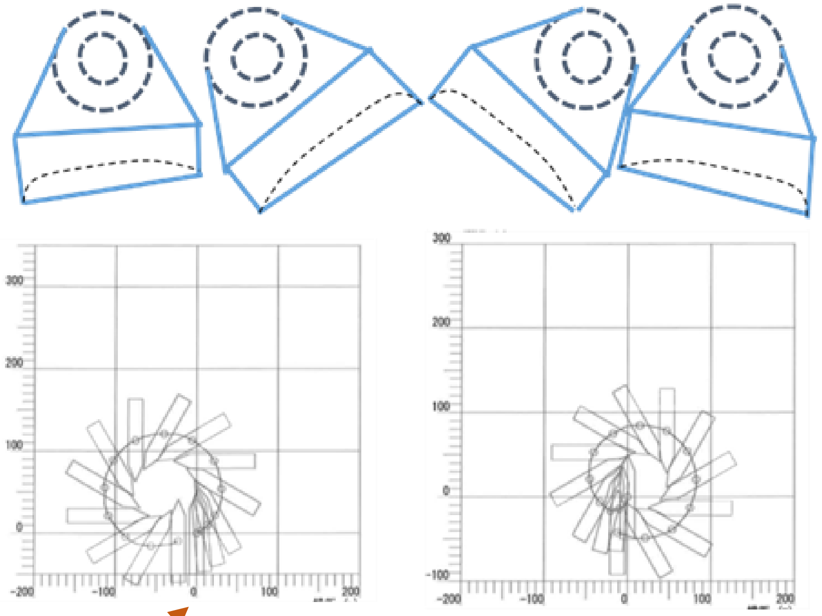


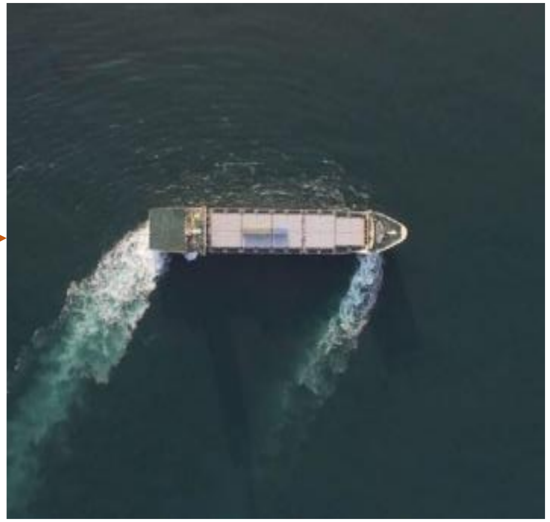
In-service fuel consumption comparisons of two sister ships, Shigenobu with GRS (red) and Sakura with CRS (blue)

Manouverability advantage of GRS



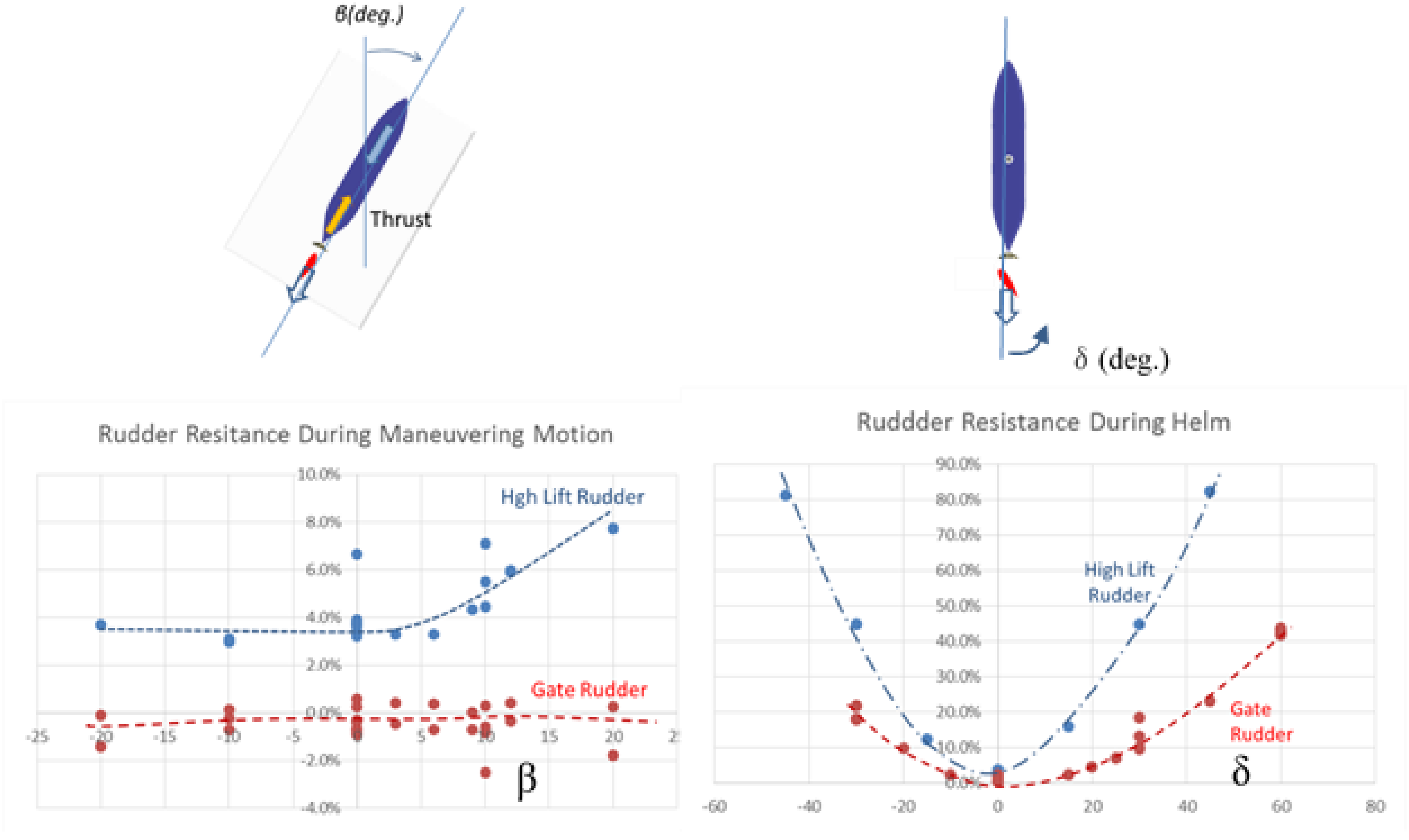
Manoeuvring modes with GRS

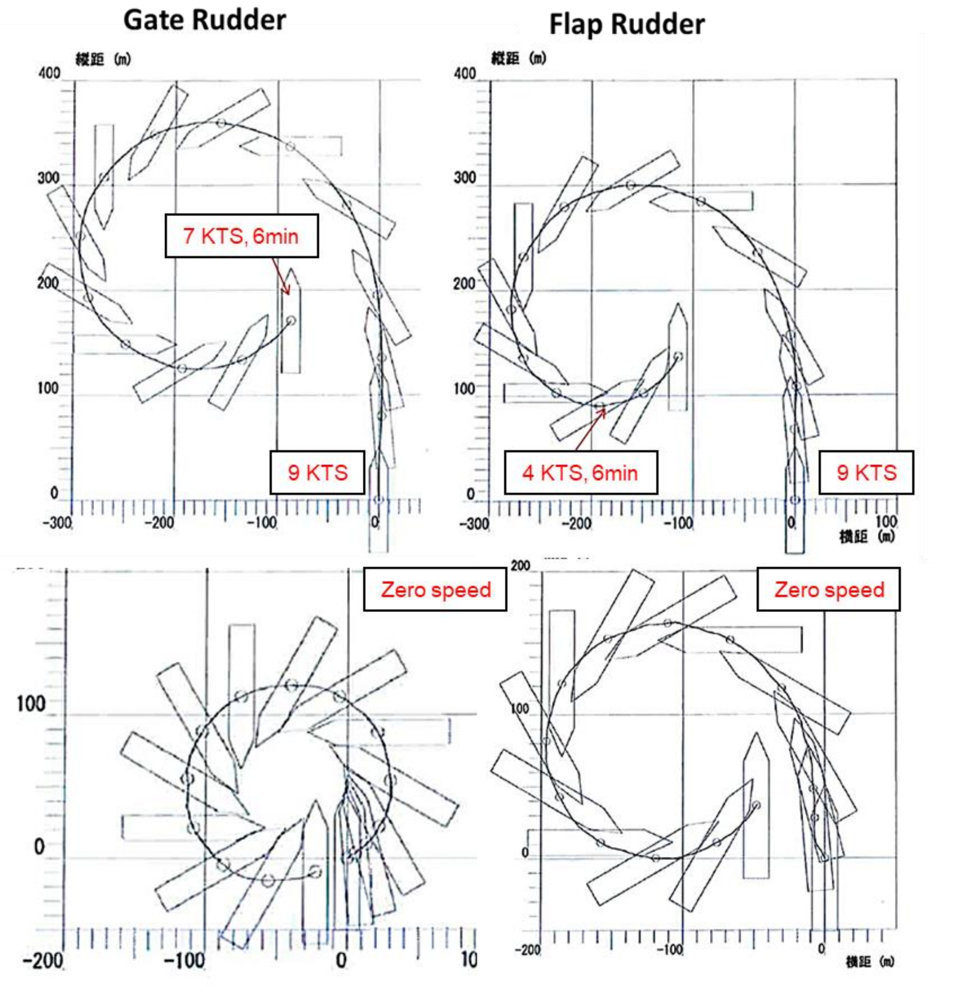




Crabbing mode

Manouverability advantage of GRS

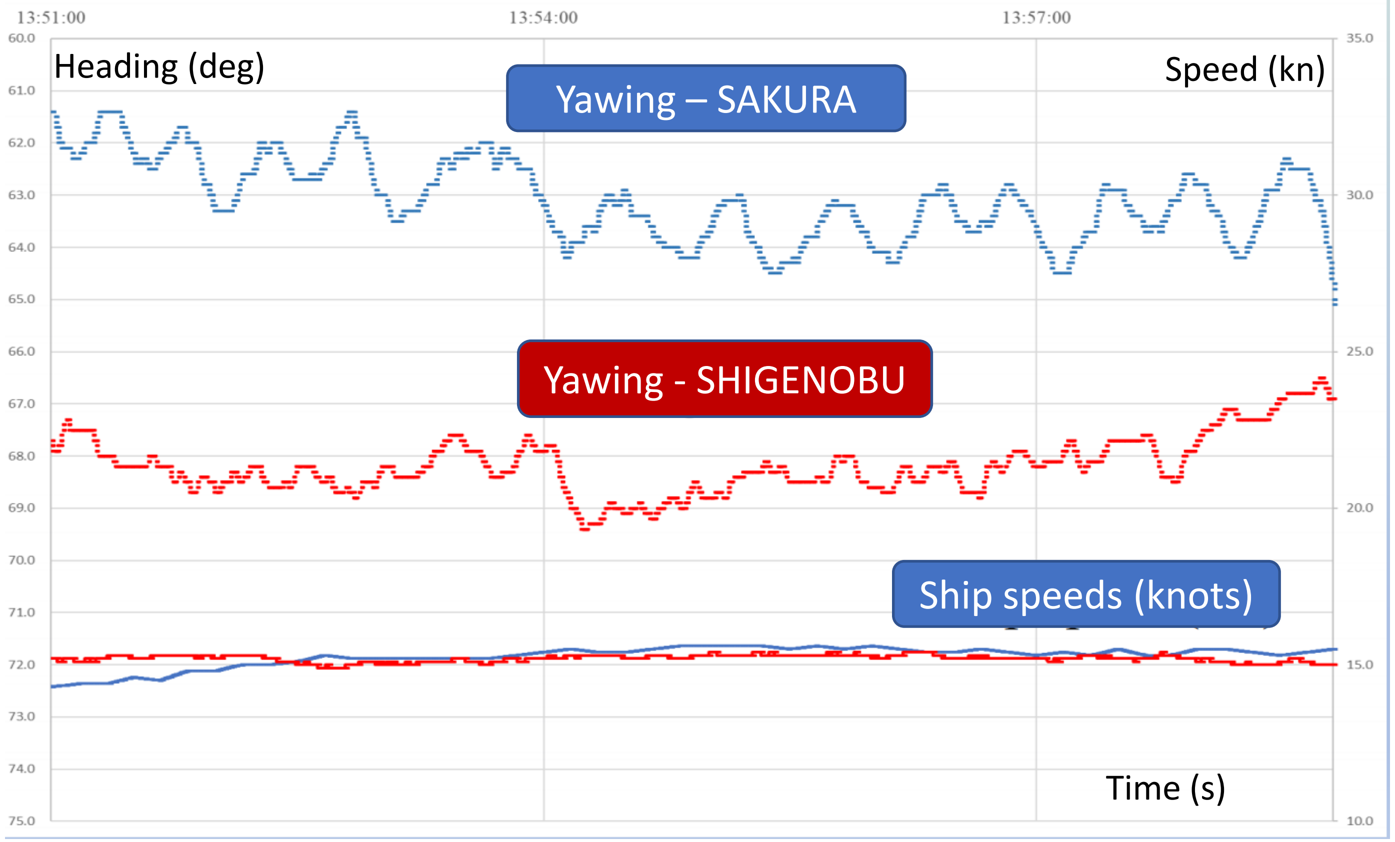




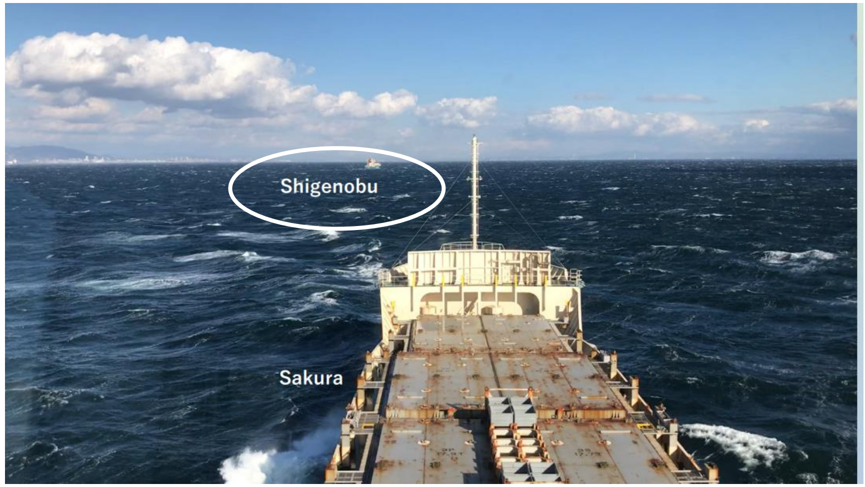
Comparison of rudder resistance (% Thrust) due to manoeuvring for conventional rudder and GRS.

Full-Scale 35^0 Circle Test (Low Speed and Zero Speed) for Ship with conventional (flap) rudder and GRS

Seakeeping advantage of GRS



Comparison of time history yawing motions recorded in (almost) side-by-side trials with SAKURA (CR) and SHIGENOBU (GRS) containerships



Sea conditions:
Wind speed: 12-24 knots
Wave height: 1.5 – 2.0m
Direction 250-270^0
Period: 30 sec

Rolling motion recorded on inclinometer:

SAKURA → 3-5^0
SHIGENBOU → 1-3^0

Motivations for GATERS Project

- The proposal responded to the H2020 Innovation Action call under the heading "***Retrofit Solutions and Next Generation Propulsion for Waterborne Transport***" (ID: LC-MG-1-8-2019).

- Although there was one new ship application of GRS (***"Shigenobu"***), ***there was/is no current application of the Gate Rudder System as a "retrofit" device***, and hence it is proposed in GATERS for the first time and this, in fact, was the primary motivation of the GATERS proposal.

- GATERS, therefore, addressed the call text explicitly "***to develop and demonstrate to TRL 6 and higher innovative, cost-effective retrofit solution for marine shipping which will provide substantial improvements regarding environmental impacts and life cycle cost***".

- Recent IMO proposal for introducing the attained ***Energy Efficiency Existing Ship Index (EEXI)*** for ships of 400 GT and above

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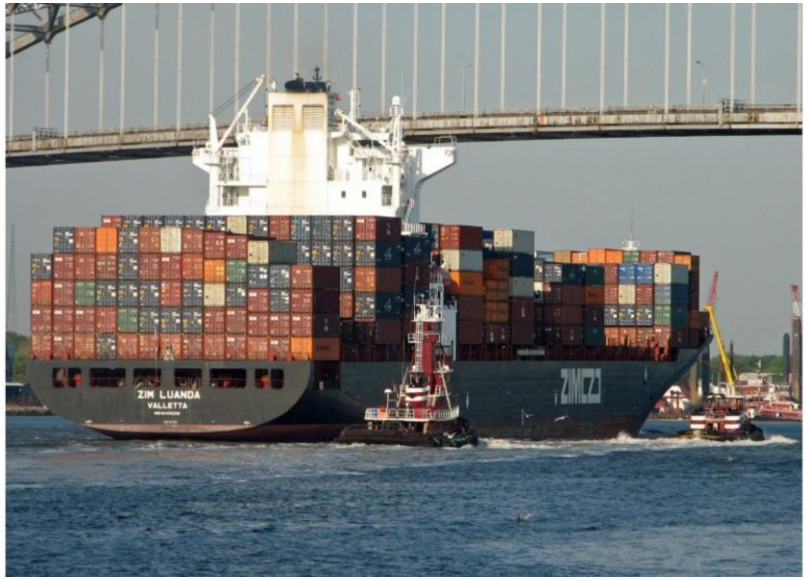
GATERS – Aims

- To bring together 18 technology experts and prime stakeholders, including the patent holder, to demonstrate and exploit the benefits of this system by two main deliverables:

➢ **To demonstrate the GR system for the European short sea shipping operations by installing and operating on a target coastal vessel.**

➢ **To explore the GR system, conceptually, for the oceangoing shipping operations, including fleet level.**

- Hence to demonstrate if the Gate Rudder System can be the next generation propulsion and steering system for the waterborne transport.



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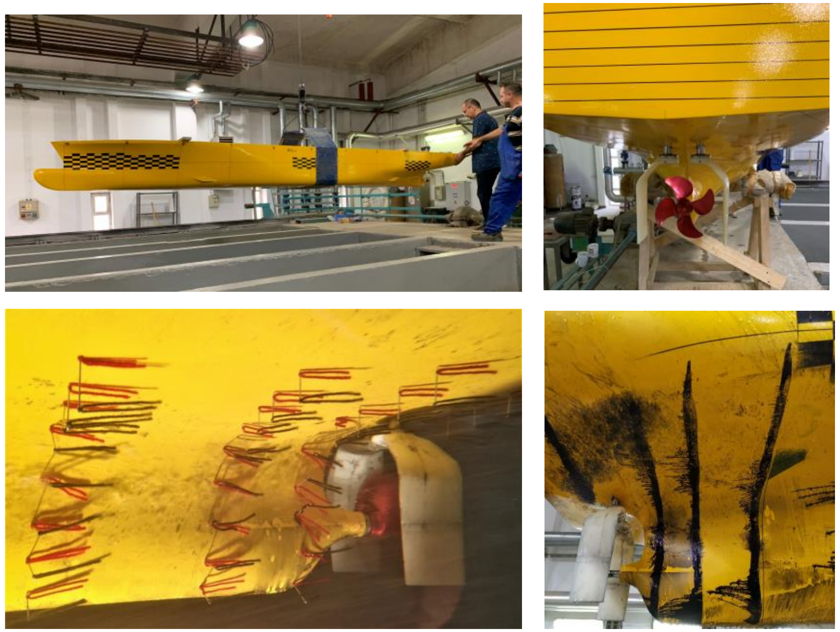
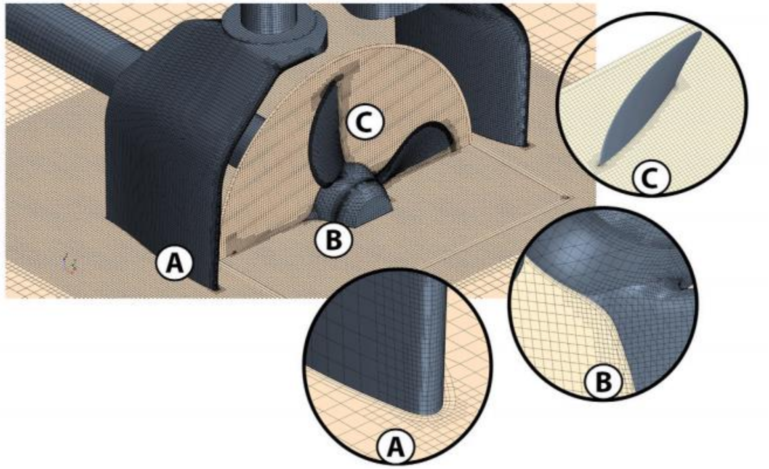
GATERS – Objectives

1. To investigate technical challenges of the Gate Rudder System (GRS) and to establish the best practice of application as a retrofit by using a combination of the computational, experimental and full-scale procedures.

2. To design a retrofit GRS at a detailed level, to manufacture and install on the coastal target cargo vessel. Hence, to demonstrate the effectiveness of the GRS by sea trials and voyage monitoring as well as its impact on the existing IMO regulations (i.e. EEDI, EEOI and Minimum power requirements) and the Life Cycle Cost (LCC).

3. To assess the overall impact of the retrofit GRS applications to major ship types for the European SSS operations and the Oceangoing Shipping (OS) operations on the existing (IMO) regulations and Life Cycle Cost (LCC) for both individual vessels as well as the fleet-level services.



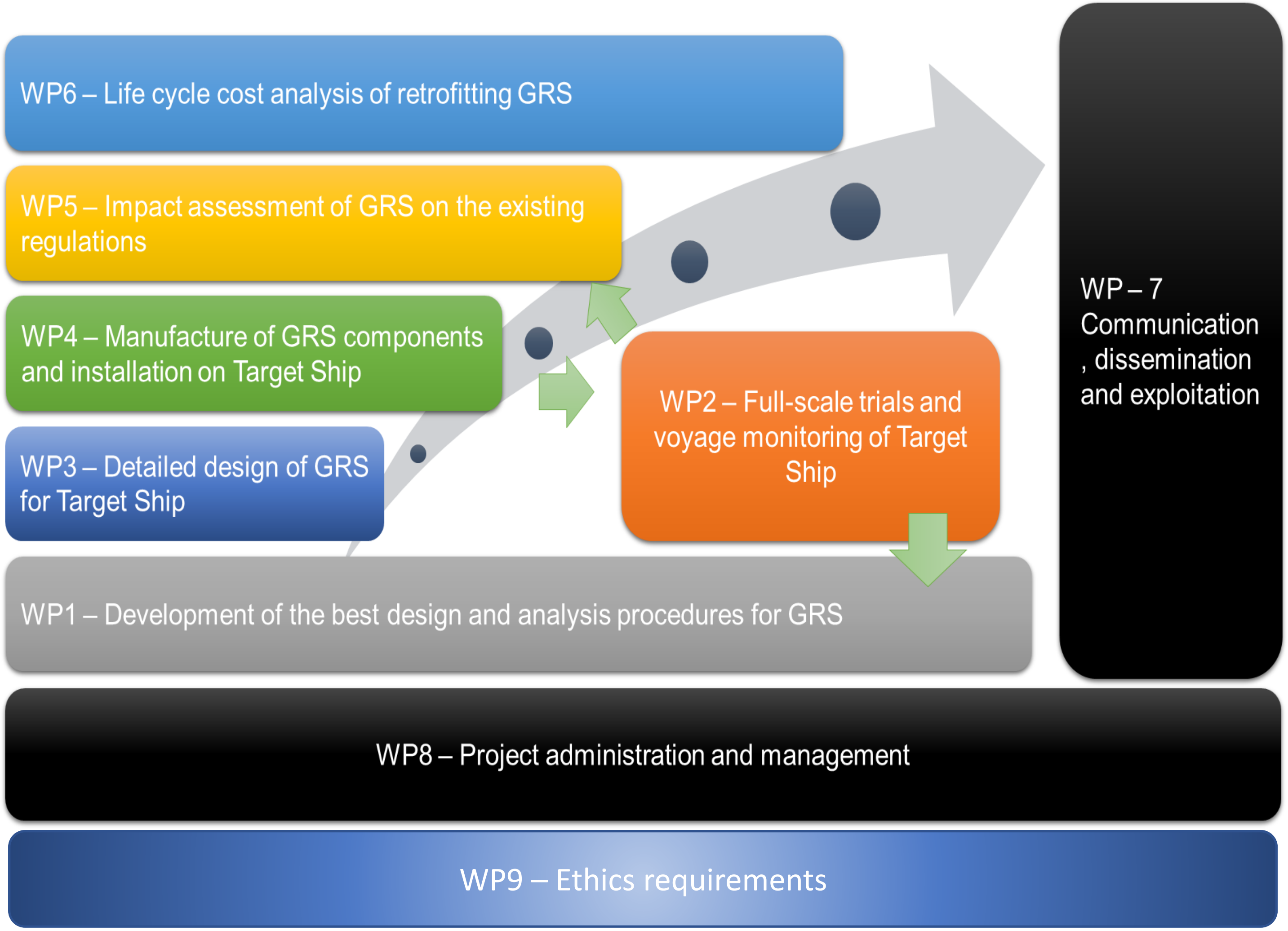


GATERS – Methodology

- **Phase-1 (Feb'21 - Feb'22):** "Development of the best procedures for the design, manufacturing and retrofitting of the GRS" – *Critical design parts of the works to achieve the retrofitting of the GRS for the target cargo vessel will be completed.*

- **Phase-2 (Feb'22 - Feb'23):** "Detailed design, manufacturing and application of the GRS retrofitting on the target ship as well as its demonstration and further procedure development" – *Retrofitting on Sept'22*

- **Phase-3 (Feb'23 – Feb'24):** "Impact of the GRS retrofitting on the existing and forthcoming regulations and life cycle cost for the European SSS operations and the Oceangoing Shipping operations" – *An overall impact assessment of the GRS retrofitting for the major ship types at a fleet level will be conducted in this phase.*



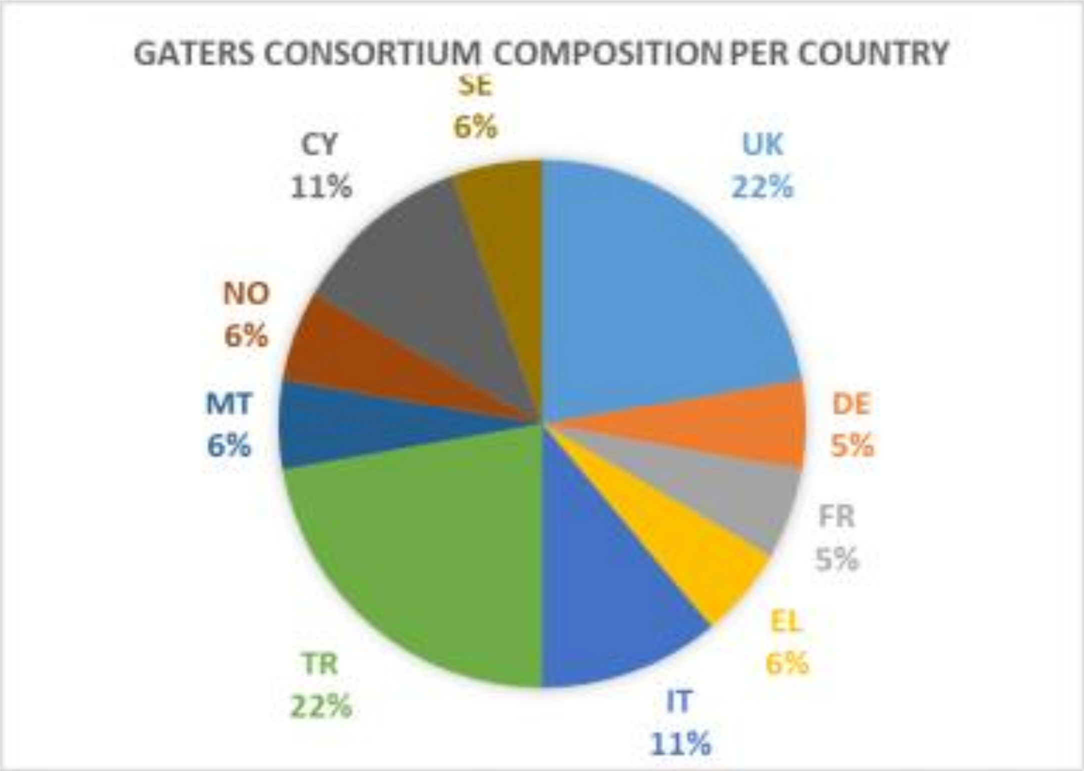
GATERS – Partners

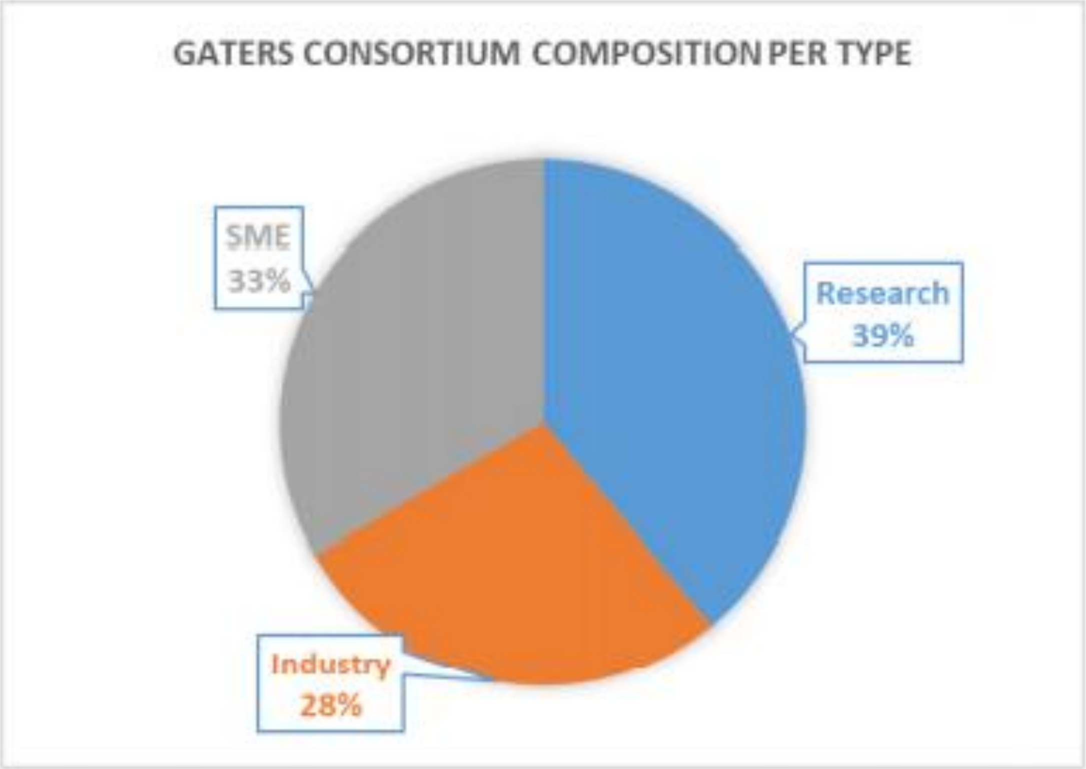
Participant No.	Participant organisation name	Acronym	Country
1 (Coordinator)	UNIVERSITY OF STRATHCLYDE	UoS	UK
2	HAMBURGISCHE SCHIFFBAU- VERSUCHSANSTALT GMBH	HSVA	DE
3	BUREAU VERITAS MARINE & OFFSHORE REGISTRE INTERNATIONAL DE CLASSIFICATION DE NAVIRES ET DE PLATEFORMES OFFSHORE	BV	FR
4	GLAFCOS MARINE EPE	GME	EL
5	CONSIGLIO NAZIONALE DELLE RICERCHE	CNR	IT
6	HIDROTEKNIK YAT GEMI DENIZ YAPILARI TASARIM TEKNOLOJILERI SANAYI VE TICARET LIMITED SIRKETI	HYD	TR
7	ISTANBUL TEKNIK UNIVERSITESI	ITU	TR

GATERS – Partners (continued)

Participant No.	Participant organisation name	Acronym	Country
8	TWI LIMITED	TWI	UK
9	NAVAL ARCHITECTURAL SERVICES LIMITED	NAS	MT
10	CAPA DENIZCILIK NAKLIYAT SANAYI VETICARET LIMITED SIRKETI	CAPA	TR
11	SINTEF OCEAN AS	SINTEF	NO
12	DANAOS SHIPPING COMPANY LIMITED	DANAOS	CY
13	STONE MARINE PROPULSION LIMITED	SMP	UK
14	GURDESAN GEMI MAKINA SANAYI VE TICARET ANONIM SIRKETI	GURD	TR
15	UNIVERSITY OF NEWCASTLE UPON TYNE	UNEW	UK
16	STAR BULK SHIP MANAGEMENT CO. (CYPRUS) LTD	STARB	CY
17	INFORMA UK LTD (LLOYD'S LIST INTELLIGENCE)	LLI	UK
18	CETENA S.P.A.	CETENA	IT

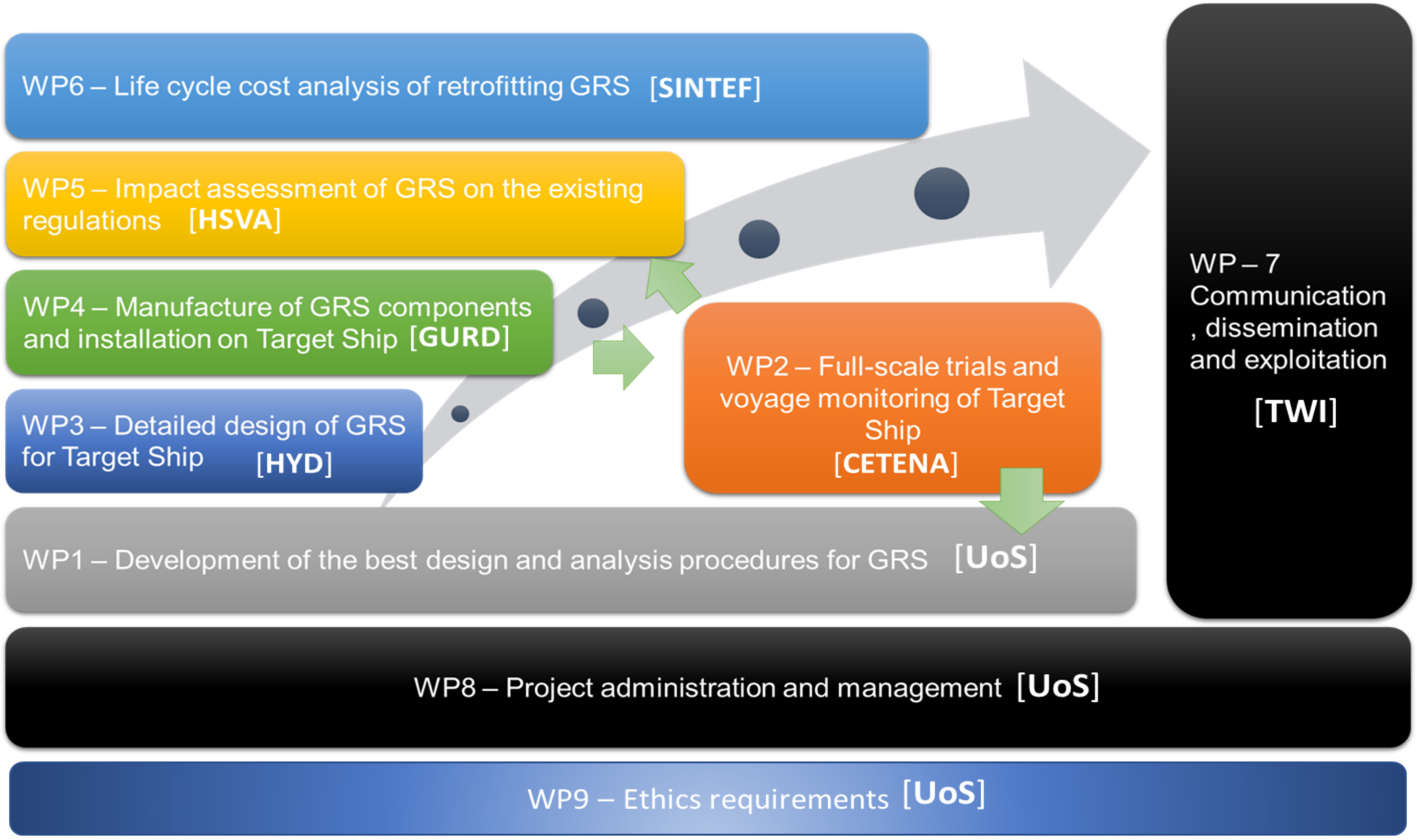
GATERS – Partners background summary





Distribution of GATERS Partners' background by Country (Left) & Type (Left)

GATERS – Work Packages



Schematic of GATERS Work Breakdown Structure in terms of Work Packages(WP) and associated leaders (WPL)

Target vessel – MV ERGE To be retrofitted with GRS

- MV ERGE (IMO No: 9508603) 5650 DWT (2993GT) General Cargo ship, built in Weihai PRC and delivered in 2011.

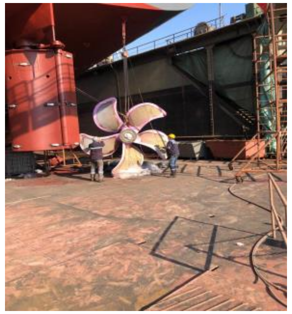
- She operates in European Coastal waters, Black Sea, Red Sea and North African waters

- She is owned by partner CAPA and she has sister vessel MV ERLE with conventional flap rudder

Parameter	MV Erge				
	Symbol	Units	Ballast Load	Design Load	Full Load
Length overall	L_{OA}	(m)	89.95		
Length between perpendiculars	L_{BP}	(m)	84.95		
Breadth	B	(m)	15.4		
Draught (midship)	T	(m)	3.3	5.6	6.45
Draught (AP)	T_A	(m)	3.8	5.6	6.45
Draught (FP)	T_F	(m)	2.8	5.6	6.45
Displacement	Δ	(ton)	3607	6339	7241
Block coefficient	C_B		0.818	0.827	0.84
Prismatic coefficient	C_P		0.823	0.829	0.843
Midship area coefficient	C_M		0.994	0.997	0.997
Waterplane area coefficient	C_{WP}		0.854	0.916	0.944
Longitudinal centre of buoyancy	LCB	(m) (+ fwd)	46.866	45.85	43.025
Longitudinal centre of floatation	LCF	(m) (+ fwd)	46.246	39.748	39.863
Longitudinal centre of gravity	LCG	(m) (+ fwd)	46.903	45.91	43.036
Verticle centre of gravity	VCG	(m)	3.23	5.4	6.095
Speed	V_S	knots	12		







GATERS – Implementation

WP1 - DEVELOPMENT OF THE BEST DESIGN & ANALYSIS PROCEDURES FOR GRS

GATE RUDDER SYSTEM AS A RETROFIT FOR THE NEXT GENERATION PROPULSION AND STEERING OF SHIPS (GATERS)

Phase-1 (M1–M12) | Phase-2 (M13–M24) | Phase-3 (M25–M36)

	Work packages & Tasks
WP 1	**DEVELOPMENT OF THE BEST DESIGN AND ANALYSIS PROCEDURES FOR THE GRS**
T 1.1	**Investigation and data collection of the existing vessels with the GRS and selection of other vessel types**
T 1.1.1	Collection of the relevant data of the existing vessel with the GRS
T 1.1.2	Collection of the relevant technical and operational data for the target vessel
T 1.1.3	Selection and data collection of representative vessel types for EU SSS and OS operations
T 1.2	**Initial design tool development for GRS**
T 1.2.1	Establish simple algorithm to estimate the main particulars of the basic GRS components
T 1.2.2	Determination of the preliminary dimensions of the GRS for the target ship
T 1.2.3	Further enhance the accuracy of the initial design tool iteratively
T 1.3	**Development/implementation of accurate model test procedures for ship models with GRS**
T1.3.1	R&P, seakeeping, noise and cavitation tests with an existing 5m container model at ITU facilities
T1.3.2	Manoeuvring tests with the free sailing container model in the ITU campus lake
T1.3.3	Manufacture of a 12m container model and R&P tests in the HSVA towing tank
T1.3.4	R&P, seakeeping, noise and cavitation tests with a 6m target ship model at the CRN-INM facilities
T1.3.5	Manoeuvring tests with the free sailing tanker model in the CNR-INM lake facilities
T1.3.6	Detailed flow investigation around GRS system using laser-based devices in ECT
T1.3.7	Dedicated performance and load measurements of GRS in open waters and waves in KHL
T 1.4	**Development of accurate CFD procedures for the full-scale performance prediction of a ship with GRS**
T 1.4.1	Calm water powering performance prediction in the model and full scale for the container vessel with GRS
T 1.4.2	Calm water powering performance prediction in the model and full scale for the target vessel with GRS
T 1.5	**Development of accurate Manoeuvring and Seakeeping simulation tools for a ship with GRS**
T 1.5.1	Manoeuvring in calm water and seakeeping in waves for the model and full-scale container vessel
T 1.5.2	Manoeuvring in calm water and seakeeping in waves for the model and full-scale target vessel
T 1.6	**Development of accurate structural design and analysis procedures for GRS**
T 1.6.1	Full-scale structural analysis of the GRS for the container vessel
T 1.6.2	Full-scale structural analysis of the GRS for the target vessel
T 1.7	**Structural design and weight optimisation of the GRS using new materials**
T 1.7.1	Investigation of potential new materials for GRS (GFRP/CFRB) and lab based material testing
T 1.7.2	Implementation and demonstration of the weight optimised GRS

WP 2 – FULL-SCALE TRIALS & VOYAGE MONITORING OF TARGET SHIP

WP 3 – DETAILED DESIGN OF GRS FOR TARGET SHIP

GATE RUDDER SYSTEM AS A RETROFIT FOR THE NEXT GENERATION PROPULSION AND STEERING OF SHIPS (GATERS)

Phase-1 (M1–M12) | Phase-2 (M13–M24) | Phase-3 (M25–M36)

Work packages & Tasks	
WP 2	**Full-scale trials and voyage monitoring of target ship**
T 2.1	**Onboard data measurements with the target ship by sea trials and voyage monitoring in-service**
T 2.1.1	Strategic planning to conduct the onboard and off-board measurement activities
T 2.1.2	Fitting of a voyage performance monitoring system to the target ship
T 2.1.3	Conduct of voyage performance monitoring in-service before the GRS retrofitting
T 2.1.4	Drydock the vessel and clean the hull
T 2.1.5	Conduct of dedicated sea trials just before the GRS retrofitting
T 2.1.6	Conduct of dedicated sea trials just after the GRS retrofitting
T 2.1.7	Conduct of voyage performance monitoring in-service after the GRS retrofitting
T 2.2	**Off-board data (URN) measurements with the target ship by sea trials**
T 2.2.1	Conduct of the URN measurements with the target ship before the retrofit
T 2.2.2	Conduct of the URN measurements with the target ship after the retrofit
WP 3	**DETAILED DESIGN OF THE GRS FOR THE TARGET (TANKER) SHIP**
T 3.1	**Design of GRS for the target ship and class approval**
T 3.1.1	Conduct the detailed hydrodynamic design of the GRS
T 3.1.2	Conduct the detailed structural design and optimisation of the GRS
T 3.1.3	Produce manufacture drawings and secure class approval
T 3.2	**Detailed design of new propeller blades**
T 3.2.1	Review and conduct of the detailed hydrodynamic design and analysis of the propeller
T 3.2.2	Conduct of the detailed structural design of the propeller to fit in the existing shaft
T 3.2.3	Conduct of manufacturing drawings and securing of class approval
T 3.3	**Specification and purchase of the steering gear machinery and control systems**
T 3.3.1	Specification of the steering gear requirements and supplier selection
T 3.3.2	Specification of the steering control (autopilot) requirements and supplier selection
T 3.4	**Overall detailed design integration of the GRS**
T 3.4.1	Review the SG room and explore the possible alteration options
T 3.4.2	Integration of all the GRS components and evaluation of its impact on the existing steering gear room
T 3.4.3	Conduct of the structural analysis to evaluate the impact of the GRS on the SG room (floor)
T 3.4.4	Structural alteration designs of the SG room (floor), hydrostatic analysis and class approval
T 3.4.5	Conduct hydrostatic analysis for the retrofited target vessel and class approval

WP 4 – MANUFACTURING OF GRS COMPONENTS & INSTALLATION ON TARGET SHIP

WP 5 – IMPACT ASSESSMENT OF GRS ON EXISTING & FORTHCOMING REGULATIONS

WP 6 – LIFE CYCLE COST ANALYSIS OF RETROFITTING GRS

GATE RUDDER SYSTEM AS A RETROFIT FOR THE NEXT GENERATION PROPULSION AND STEERING OF SHIPS (GATERS)

Phase-1 (M1–M12) | Phase-2 (M13–M24) | Phase-3 (M25–M36)

	Work packages & Tasks
WP 4	**MANUFACTURING OF THE GRS COMPONENTS AND INSTALLATION ON THE TARGET SHIP**
T 4.1	**Strategic planning of the GRS installation on the target ship**
T 4.1.1	Review of the target ship's original steering gear room and machinery
T 4.1.2	Review of the GRS components and their installation requirements in the steering gear room
T 4.1.3	Making plan (i.e. procedure steps) for the installation process
T 4.2	**Manufacture and purchase of the GRS components**
T 4.2.1	Manufacturing of the gate rudder blades and delivery to the ship yard
T 4.2.2	Manufacturing of the new propeller blades and delivery to the ship yard
T 4.2.3	Purchasing of the steering gear machinery and autopilot and delivery to the shipyard
T 4.3	**Installation of the GRS on the target ship**
T 4.3.1	Removal of the existing Steering Gear (SG) system and enhancement of the SG room
T 4.3.2	Installation of the GR system components as required and planned
WP 5	**IMPACT ASSESSMENT OF THE GRS ON THE EXISTING AND FORTHCOMING REGULATIONS**
T 5.1	**Impact on the IMO requirements and EU regulations for the target vessel**
T 5.1.1	To assess the impact on the target ship in terms of the IMO's requirements
T 5.1.2	To assess the impact on the target ship in terms of the EU regulations
T 5.2	**Impact on the IMO requirements and EU regulations for wider ship types and different operations**
T 5.2.1	To assess the impact on the representative wider ship types for the EU SSS operations
T 5.2.2	To assess the impact on the representative wider ship types for the OS operations
T 5.3	**Impact on the IMO requirements and EU regulations for wider ship types at fleet level operations**
T 5.3.1	To assess the impact on the representative wider ship types for the EU SSS fleets
T 5.3.2	To assess the impact on the representative wider ship types for the OS fleets
WP 6	**LIFE CYCLE COST (LCC) ANALYSIS OF RETROFITTING A GRS**
T 6.1	**Cost effectiveness analysis and comparison amongst GRS solutions and against other ESDs**
T 6.1.1	Development of CAPEX and OPEX for different types and sizes of vessels equipped with GRS
T 6.1.2	Comparative CAPEX and OPEX analysis of GRS for new build and retrofited ships
T 6.1.3	Comparative CAPEX and OPEX analysis of GRS against other selected energy-saving devices
T 6.2	**LCC analysis for the GRS retrofit**
T 6.2.1	LCC analysis of retrofitting the GRS for the target ship
T 6.2.2	LCC analysis of retrofitting the GRS for the wider ship types for the EU SSS and OS
T 6.2.3	LCC analysis of retrofitting GRS to the fleets

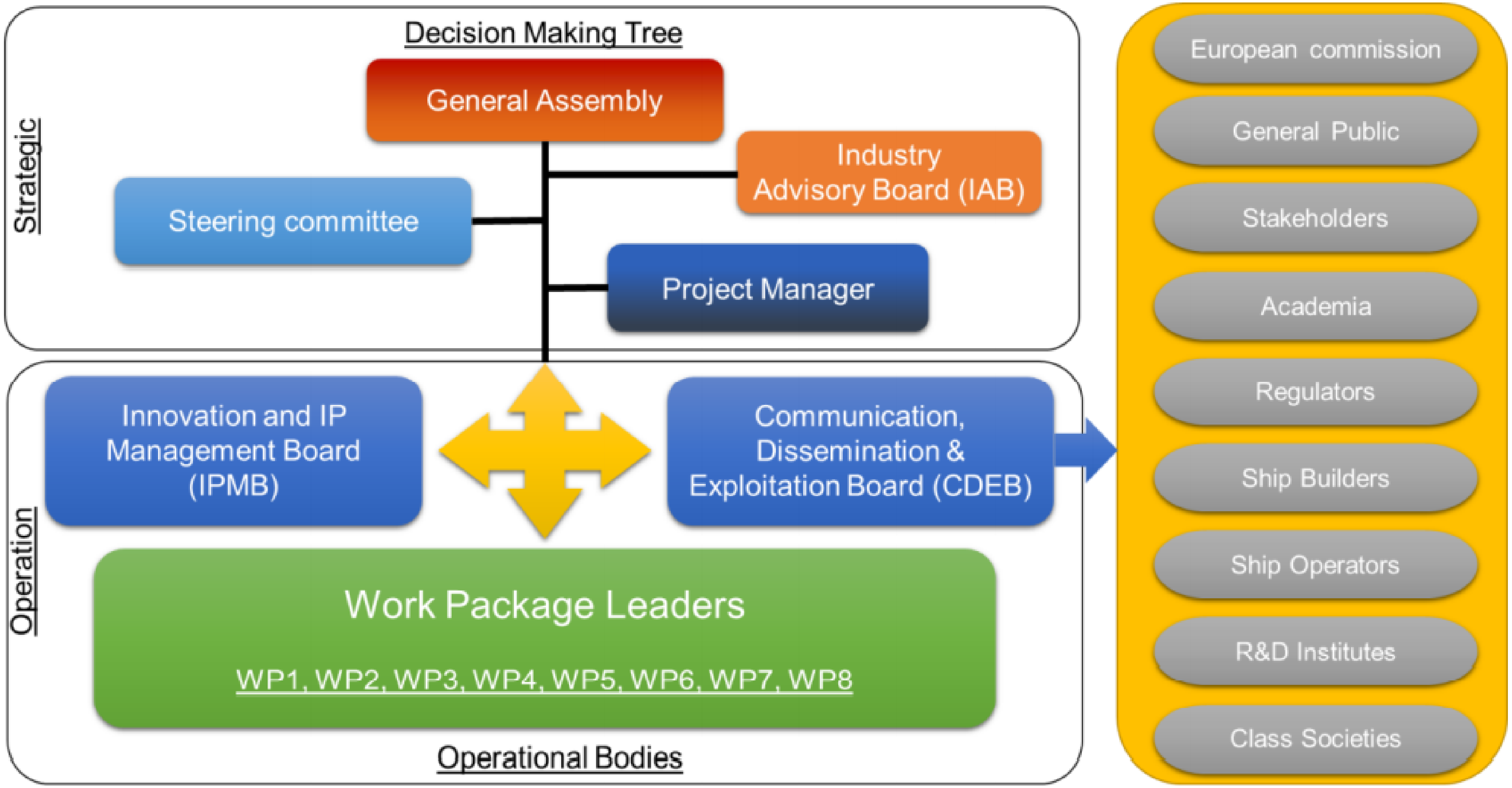
WP7 – COMMUNICATION, DISSEMINATION & EXPLOITATION ACTIVITIES

WP8 – PROJECT ADMINISTRATION & MANAGEMENT

WP9 – ETHICS REQUIREMENTS

GATE RUDDER SYSTEM AS A RETROFIT FOR THE NEXT GENERATION PROPULSION AND STEERING OF SHIPS (GATERS)		Phase-1												Phase-2												Phase-3											
Work packages & Tasks		M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36
WP 7	COMMUNICATION, DISSEMINATION AND EXPLOITATION ACTIVITIES																																				
T 7.1	Strategic planning, coordination and organisation																																				
T 7.2	Project communication activities																																				
T 7.3	Project dissemination activities																																				
T 7.3	Project exploitation activities																																				
WP 8	PROJECT ADMINISTRATION AND MANAGEMENT																																				
T 8.1	Administrative and financial management																																				
T 8.2	Scientific and technological management																																				
MS	PROJECT MILESTONES												MS1		MS2				MS3		MS4												MS5				MS6
GATE RUDDER SYSTEM AS A RETROFIT FOR THE NEXT GENERATION PROPULSION AND STEERING OF SHIPS (GATERS)		M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36

GATERS – Management structure



GATERS – Management, Communication, Dissemination & Exploitation Activities Support Boards

GATERS - Innovation and IP Management Board (IPMB)

Project Members	GME	HYD	SMP	TWI	UoS

GATERS - Communication, Dissemination and Exploitation Board (CDEB)

Project Members	CAPA	GME	HYD	SMP	TWI	UNEW	UoS

GATERS - Industry Advisory Board (IAB) and representatives

Member Institution / Company	Royal Caribbean Cruise Ltd	Wartsila Netherlands BV	Hellenic Tankers Co Ltd	Oscar Propulsion Ltd	Kuribayashi Steam Co Ltd	Shell Int’l Trad & Shipping Co Ltd
Member’s Representative	Dr Tor E Svensen	Dr Elias Boletis	Dr Christos Verventitos	Mr David Taylor	Mr Hirohisa Inada	Mr James Cocks

GATERS – Financial

Project fund

Total Project Fund [EUR]	EU Contribution [EUR]	Industry Contribution [EUR]
5,878,364.25	4,999,509.98	878,854.27

Project cost breakdown

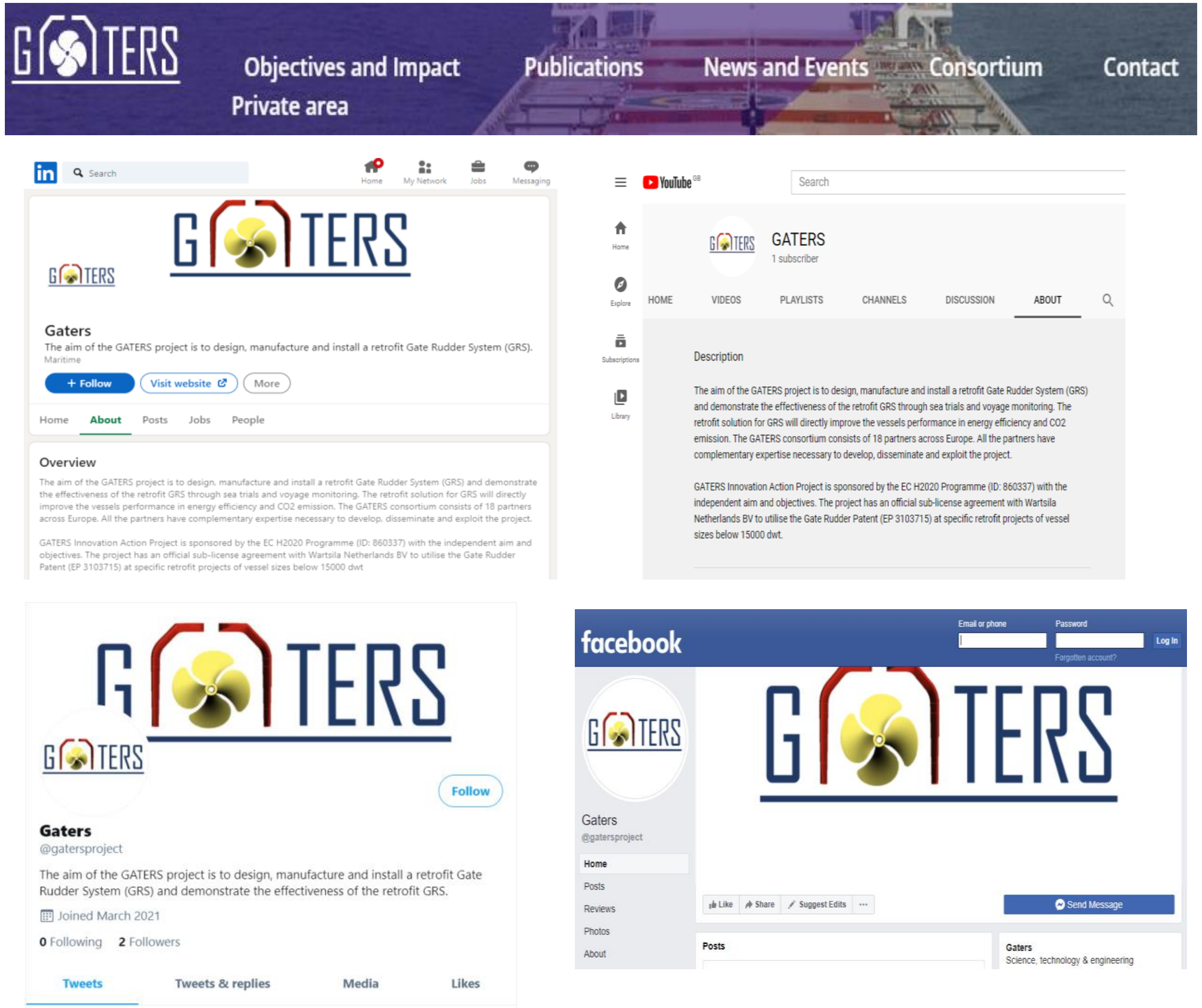
Personal cost [EUR]	Travel, Equipment & Other cost [EUR]	Indirect cost (25% Flat rate) [EUR]	Total cost [EUR]
3,131,085.40	1,571,606.00	1,175,672.85	5,878,364.25

Project time and effort

Project elapsed duration [months]	Project person efforts [months]
36	694

Progress on GATERS Project so far

www.gatersproject.com



- Project was officially started in February 2021 with a kick-off meeting held on 24th of February

- Project website was launched as well as other CDE activities have been underway including social media interfaces

- **WP1** (Preliminary Gate Rudder Design; Model testing and CFD modelling procedure development tasks); **WP2** (Target Vessel Trials and Monitoring System installation and data collection task); **WP7** (Communication, Dissemination and Exploitation activities tasks); **WP8** (Day-to-day management tasks) are underway

- First two critical milestones (MS1 and MS2) are to complete the model tests and confirm the design of the GRS for MV ERGE on M12 and 14, respectively.

University of Strathclyde Glasgow

2ND DECARBONIZING SHIPPING VIRTUAL FORUM
APRIL 27, 2021
06:00 AM MIAMI | 12:00 HAMBURG

GATERS

THANK YOU

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on behalf of the GATERS Consortium

GATERS Project - Summary

- **Project number**: 860337
- **Project Acronym**: GATERS
- **Project title**: GATE Rudder System as a Retrofit for the Next Generation Propulsion and Steering of Ships
- **Call (part) ID**: H2020-MG-2019-Two-Stages
- **Topic**: LC-MG-1-8-2019 (Retrofit Solutions and Next Generation Propulsion for Waterborne Transport)
- **Fixed EC Keywords**: Maritime, Low emission technology in transport
- **Free keywords**: Novel propulsion and manoeuvring system; Retrofit technology; Short sea shipping operations; Oceangoing shipping operations; Generic and flexible propulsion system; IMO requirements for Emission
- **Starting Date**: 1 February 2021
- **Duration**: 36M
- **Funding:** 5.894,822.5 M EUR (total); 4,999,510.0M ER (EU requested)
- **Call (part) ID**: H2020-MG-2019-TwoStages
- **Partners no**: 18 (11 Industry + 4 Research Institutes + 3 Universities)
- **Country no:** 9
- **Partners** : UoS(UK); HSVA(DE); BV(FR); GME(GR); CNR(I); HYD(TR); ITU (TR); TWI (UK); NAS (MT); CAPA(TR); SINTEF(NO); DANAOS(CYP); SMP(UK); GURD(TR); UNEW(UK); STARB(CYP); LLI(UK); CETENA(I)
- **Coordinator:** University of Strathclyde (UoS) ; Prof Mehmet Atlar (mehmet.atlar@strath.ac.uk) ; Tel: +447900890228