DT4GS

Digital Twins for Green Shipping

D5.1: *Dissemination & Communication v1*

Document Information

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Executive summary

The purpose of the deliverable is to serve as the main DT4GS Dissemination and Communication document which effectively is the project's guidance document for all dissemination and communication activities. This document outlines an approach to reaching out and communicating to the target audience, by developing communication tools, defining a series of tailored actions, its timeline and persons responsible. It also sets quantified measures for monitoring progress and impact of the dissemination actions.

The work carried out includes two sub tasks:

- ST5.1.1 Dissemination & Communication material and website. Key outcomes will be presented in the form of news articles, reports, presentations etc. Two (2) professional videos highlighting the LLs, their challenges, the project vision, and expected outcomes will be produced. DT4GS will have accounts in several social media communities, such as Twitter, Facebook, YouTube, and LinkedIn. All accounts will be integrated into the project website.
- ST5.1.2 Perform networking, alliance across projects, and liaison activities. Communication packages for LLs and promotional events will be carried out, and a major EU conference will be delivered in M24.

This document will be updated throughout the project by the partners involved, in order to review the results and provide status and updates about the planned activities and expected impacts.

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Glossary of terms and acronyms used

Table 1 Glossary of acronyms and terms.

Acronym / Term	Description
EU	European
EUSEW	European Sustainable Energy Week
D&C	Dissemination and Communication
DT	Digital Twin
GA	Grant Agreement
GS	Green Shipping
KO	Kick-Off
KPI	Key Performance Indicator
MS Teams	Microsoft Teams
WP	Work Package
LLs	Living Labs
OSP	Open Simulation Platform Conference

1 Introduction

The present deliverable is part of the WP5 "DT4GS Dissemination, Scale-up, Innovation management, Commercialisation and Policy Recommendation", and addresses the objectives of the respective task T5.1 ''Dissemination and Communication", while it sets the foundations for the development and implementation of the succeeding Tasks within the WP5.

The DT4GS Dissemination and Communication document is the project's guidance document for all dissemination and communication activities and will be updated regularly until its second version (D5.2) in M36. This report outlines an approach to for reaching out and communicating to the target audience, by developing communication tools, defining a series of tailored actions, its timeline and persons responsible. It also sets quantified measures for monitoring progress and impact of the dissemination actions.

The framework for communication and dissemination in DT4GS is built on Chapter 2, with an analysis of the project goals and impact and consequent communication and dissemination objectives. This chapter also breaks down the communication and dissemination pillars, the target groups, defines the key messages and the different phases of the dissemination strategy and the project logo usage guidelines.

The Chapter 3 presents the dissemination tools and materials and goes into further detail, looking at the plan and execution of the dissemination and communication strategy including the timing of activities and responsibilities.

An overall conclusion is drawn in Chapter 4 and will be updated throughout the project.

1.1 Mapping DT4GS Outputs

The purpose of this section is to map DT4GS Grant Agreement commitments, both within the formal Deliverable and Task description, against the current document.

Table 2 Adherence to DT4GS Grant Agreement deliverable and work description.

DT4GS GA Component Title	DT4GS GA Component Outline	Respective Document Chapter(s)	Justification
DELIVERABLE			
D[5.1] [Dissemination & Communication v1]	*Establish project communication and dissemination Strategy/Plan and report. This deliverable includes the outputs of T5.1.*	*Chapter 1,2*	*Dissemination and Communication Plan. Chapter 2 outlines the detailed Dissemination and Communication Pillars.*
TASK			
T[5.1] [Dissemination& Communication]	*An agile communication and awareness plan including communication activities will be developed at the beginning of the project M6, and periodically updated during the project's course. The project will contribute, upon invitation by the CINEA, to common information and dissemination activities to increase the visibility and synergies between HE/H2020 supported actions.*	*Chapter 3*	*Establishing dissemination tools and communication channels. Chapter 3 describes in detail how the dissemination tools and communication channels will be established and referes to progress and monitoring of dissemination activities.*

ST5.1.1 Dissemination & Communication material and website	*Key outcomes will be presented in the form of news articles, reports, presentations etc. Two (2) professional videos highlighting the LLs, their challenges, the project vision, and expected outcomes will be produced. DT4GS will have accounts in several social media communities, such as Twitter, Facebook, YouTube, and LinkedIn. All accounts will be integrated into the project website.*	*Chapter 3*	*Referes to progress and monitoring of dissemination activities through presentations, social media and the project website. Any information about potential conferences & events to attend and present the DT4GS work.*
ST5.1.2 Perform networking, alliance across projects, and liaison activities	*Communication packages for LLs and promotional events will be carried out, and a major EU conference will be delivered in M24.*	*Chapter 3*	*Referes to a sheet which is populated with the pertinent projects listed in the GA.* *a) add more projects to connect with (ideally recent and active projects, not old)* *b) complete as much information as possible to help with the reporting* *c) the person(s) already linked with each project, needs to initiate the contact with that project and WEGEMT will coordinate the actions to take it further.*

1.2 Deliverable Overview and Report Structure

D5.1 is separated in the following 5 distinct chapters.

Chapter 1: Introduction. Chapter 1 is an introduction to D5.1 and includes the following sections

1.1 Mapping DT4GS Outputs

1.2 Deliverable Overview and Report Structure

Chapter 2: Dissemination and Communication Plan. Chapter 2 outlines the detailed Dissemination and Communication Plan and includes the following sections:

2.1 Project goals and impact

2.2 Communication and Dissemination Pillars – Objectives

2.3 Target groups

2.4 DT4GS identity: logo

Chapter 3: Establishing dissemination tools and communication channels. Chapter 3 describes in detail how the dissemination tools and communication channels will be established and includes the following sections:

3.1 Communication material and information Exchange

3.2 Social media

3.3 Website and online presence

3.4 Press releases

3.5 Project Events

3.6 External events

3.7 Progress and monitoring of dissemination activities

Chapter 4: Conclusions

Chapter 5: References

2 Dissemination and Communication Plan

2.1 Project goals and impact

DT4GS aims to deliver an "Open Digital Twin Framework" for both shipping companies and the broader waterborne industry actors to tap into new opportunities made available through the use of Digital Twinning innovations.

2.2 Communication and Dissemination Pillars – Objectives

The DT4GS consortium will promote the project and its results, in order to maximise the expected impacts of the project. Measures to maximise the DT4GS project expected impact will rely on this Dissemination Plan and they will be divided as following:

- Dissemination of key information (approach, technologies, results, etc.) generated during the project lifetime.
- Communication on the progress from the beginning of the project onwards to create awareness about the project and to make stakeholders at all levels participate in the project activities as a quality control at the different stages of development.

2.3 Target groups

The key element for an effective and successful strategy is a structured and clear identification of the target audience, their characteristics, needs and main interests in the DT4GS activities. This is fundamental to be able to tailor the communication and ensure the achievement of the dissemination goals.
In the very initial phase of the project, dissemination will be focused on presenting the project for raising awareness among stakeholders (all target audiences). Following the generation of research outputs, it will be more focused to the scientific community, standardization organisations and key industry representatives.
As the project progresses, dissemination will focus on presenting results related to DT4GS solutions (the whole solution and each of the subsystems and tools) through specific outreach activities to all audiences. By the end of the project, the focus will also be oriented towards industrial demonstration and the technology replication potential.
The DT4GS stakeholder base is particularly vast and it will increase during the project implementation. Indeed, one of the main goals of the project will be to build a community of interested stakeholders. The main target audiences(early adopters) of DT4GS Dissemination and Communication are shown in Table 3
.

Table 3 Target audience

Target audience
Shipping companies and their consultants
Shipyards
Decarbonisation solution providers
Classification societies
EU and national government policy makers
The shipping industry

2.4 DT4GS identity: logo

The project identity relates to the appearance and visibility of the project towards the external stakeholders.
At the heart of the project identity is the DT4GS logo, which establish a common and recognisable DT4GS brand and visually translate the scope and vision of the project.

2.4.1 Logo usage guidelines

The DT4GS logo will be used across all communication and dissemination materials. For these purposes, the logo should be used whenever possible, following the guidelines below (Figure 1):

- Colors have been updated and it has been created a horizontal version that works better in the website heading.
- Fonts are “Arial black” for titles and “Open sans” for text.

Figure 1 DT4GS guidelines

3 Dissemination tools and communication channels

3.1 Dissemination Tools for Internal communication

Day-to-day discussions and exchange of information will be done by use of common Internet communication tools, among them are video conferencing, e-Mail, shared folders and others.

3.2 Dissemination Tools for Internal communication

ClickUp Platform: In order to setup a strong internal communication network between the DT4GS consortium partners and the dissemination manager, WEGEMT presented in the kick off meeting a useful platform that will be used for the dissemination and communication (see Annex VI: Clickup platform) and an initial plan for regularly collecting dissemination related information from all the consortium partners throughout the duration of the project (see Annex V: DT4GS Initial planning of posts). The idea behind this was to collect all the communication and dissemination requests in one place, so that it can be easily tracked, updated and relayed to the various communication channel . This platform will help all the consortium partners to plan, organize and collaborate more efficiently. In the first step, WEGEMT charged all partners to assign a person from their company who will be responsible for responding directly to the dissemination manager for any requests. In brief the responsibilities of this person would be twofold:

- On one hand they will need to promptly respond to any requests for information, stories, posts, news etc. from the dissemination manager and to frequently access the software used to record all dissemination activities (i.e. the dissemination manager contacts this person and they need to respond back to us) and
- On the other hand they will be in charge of reporting back to the dissemination manager any DT4GS related activities directly generated by the partner like participation to events and conferences where DT4GS is promoted, company newsletters, posts, press conferences, publications etc. (i.e. the partner reports the activity and the dissemination manager takes the necessary action to publish their information).

3.2.1 Dissemination Tools for External communication

To maximize the project impact and cost efficiency, project stationary, including general (PowerPoint) presentation, (e-)newsletters, brochures/and leaflets, and any other dissemination materials will be developed for promoting the research being carried out during selected fairs and exhibitions. These materials will not only be project-related but will also be sector-related in terms of both content and visual, so that their design can be successfully used after the project will end. More information regarding the project materials (i.e., poster/rollup, white paper, project videos, scientific publications) is described in Table 6 .
The final project videos will capture in an impactful visual manner the entire research results achieved by DT4GS and the final-product that will be available to industry. These videos will also serve as a very important marketing and communication tool during the exploitation and commercialization phase of the project. The leaflet will be the main tool for the external communication, to be used for promoting the project at events, conferences, workshops and other occasions. All the project dissemination material should follow the project identity (logo, colors and typography) to make a coherent link between other communication tools. They will convey the project's main objectives and planned impacts and promote the website and social media platforms and references as a source for further information.
In order to achieve a better visibility and awareness of the DT4GS project, a video that will be made at the end of the project will contribute to the communication strategy. The video can be used in social media posts, on video sites such as YouTube, on project and partner websites and in presentations and will focus on presenting the relevant project results according to the type of the event, the category of stakeholders targeted and the foreseen level of involvement from the project partners. DT4GS first flyer

was prepared in M3 of the project and will be used in any conference that the consortium partners will be participating in Annex I.

3.3 Social media

Social Media channels are nowadays the key and the most valuable tool in disseminating messages and raising awareness, in particular following the COVID19 pandemic. Looking to get a better understanding of the project and its objectives the social media landscape could help the promotion approach. By using social media effectively, DT4GS can increase the impact of the work carried out and positively influence communities. Additionally, social media can be used as a means of meeting and sharing ideas with other researchers in the respective field, thereby expanding the scholarly and networking activities.
By using social media to its full potential, the aim is to:

- Boost the influence that DT4GS will have within its field
- Create greater interaction and collaboration with other experts in the field on a European scale.
- The assumed KPI is an uptake in social media activity compared to the initial state-of-play covering shipbuilding sector related research, with noticeable peaks during event participations, showcasing prominent presence and participation in large strategic shipbuilding companies events.

Taking the above into consideration, DT4GS will employ all communications channels deemed necessary to get the information across all groups of stakeholders, in different contexts and moments in time. Both online and physically based communications channels and tools will be used throughout the lifetime of the DT4GS project, each of them according to their efficiency and relevance for the dissemination actions that are implemented.

In addition to the more traditional tools for communication, the project will benefit from the visibility and immediacy of social media. Twitter and LinkedIn are the main channels to share and promote the DT4GS project. Communication via social media is proactive, short and targeted, using visualization of the messages through photos, graphics, infographics, short videos, polls, etc. Furthermore, strategies for assuring the real-time collaborative coverage of the project's events are designed and implemented, encouraging the use of hashtags by participants to identify the content on the web.
For the project purpose, the Social Media channels used are:

- **LinkedIn**, a business - professional social media channel where professional messages are shared. The LinkedIn feed is visible from the project web site and the LinkedIn account was given the following handle: https://www.linkedin.com/showcase/86624621/admin/
- **Twitter,** which is becoming more and more a news roll media sending out news items. DT4GS will use Twitter to send out news items and tag relevant other news media and stakeholders in the messaging. The twitter feed is visible from the project web site and the twitter account was given the following handle: @DT4GS/ https://twitter.com/home
- It is as well setup a **Facebook** account: DT4GS - The Digital Twin for Green Shipping
- A **Youtube Channel** account is also created under the following link: https://www.youtube.com/user/DT4GS

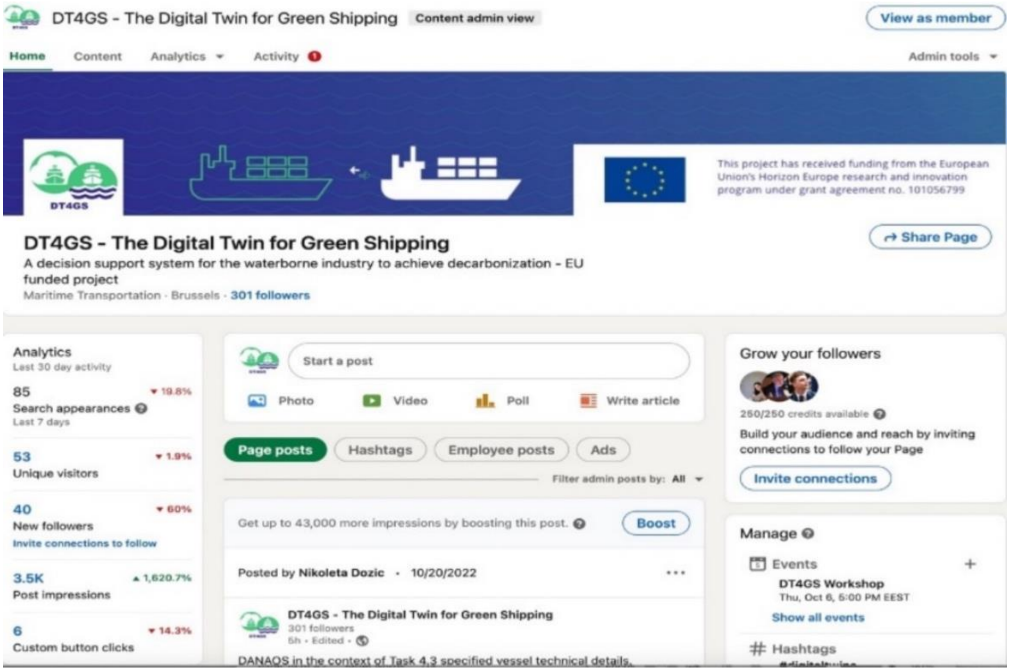

Figure 2 DT4GS LinkedIn account screenshot

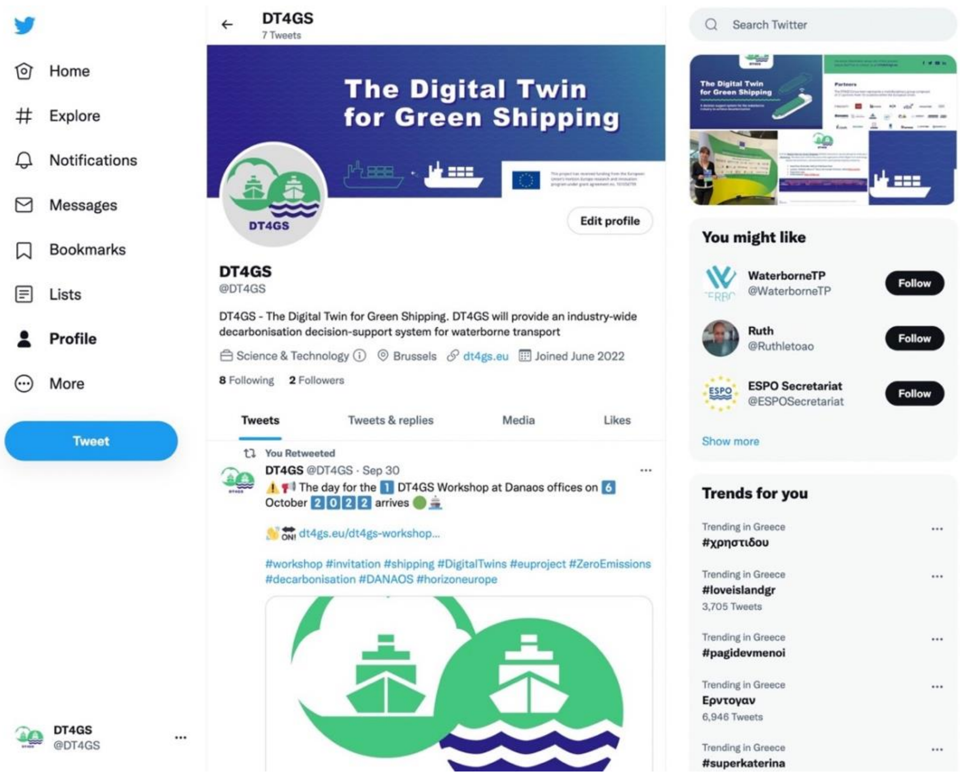

Figure 3 DT4GS Twitter account screenshot

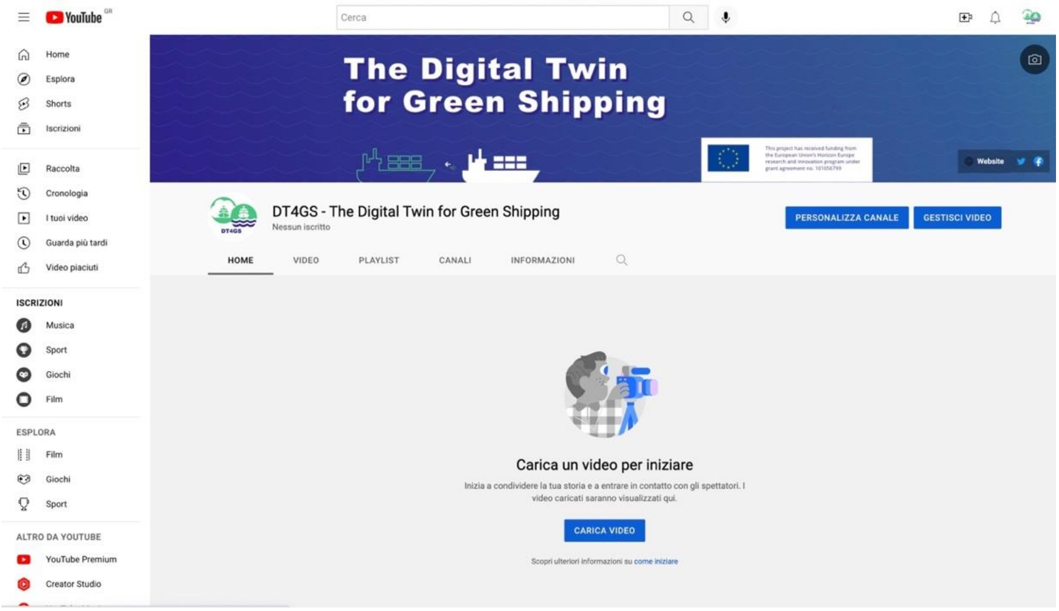

Figure 4 DT4GS Youtube account screenshot

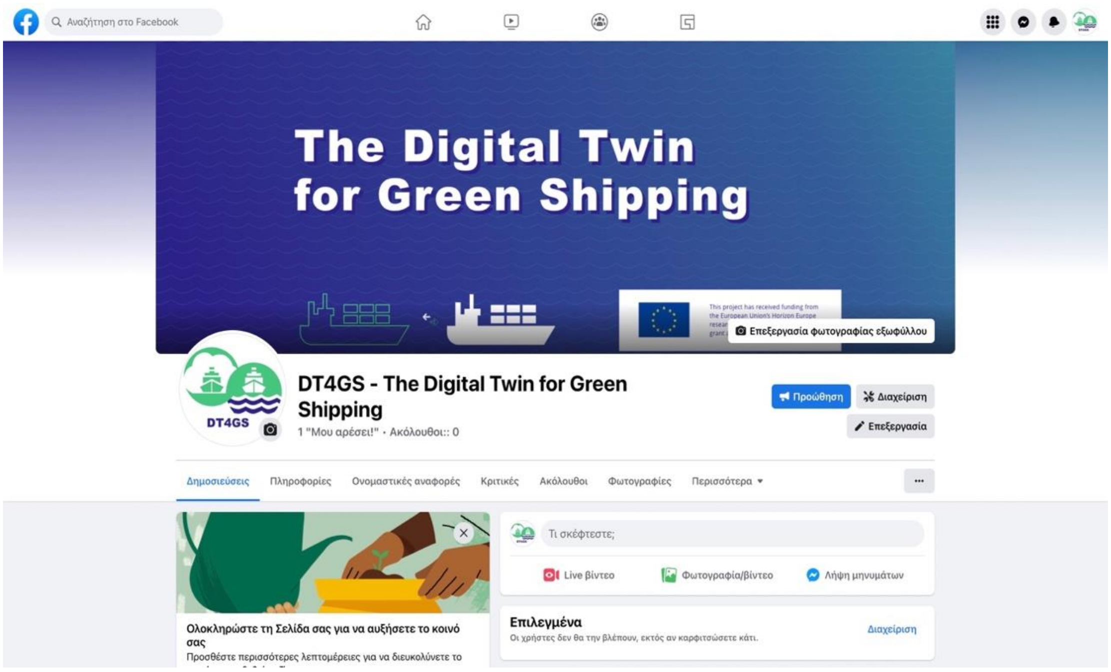

Figure 5 DT4GS Facebook account screenshot

3.4 Website and online presence

The project website is the central element of the project's dissemination strategy. It is registered under https://dt4gs.eu/ and designed to be the main tool to communicate and disseminate the knowledge produced by the project and make it available to the appropriate audiences. It presents the project concept and plans and will be continuously updated throughout the project duration to incorporate the outcomes and outputs of the project, as well as key information (policy developments, publications) relevant to the project.

The website is designed to be informative yet straight forward with clear language to ensure wide communication with diverse categories of stakeholders and external audience. Its design privileges an easy-to-follow menu with dynamic content - images and diagrams, in addition to text. Furthermore the responsive design approach will allow the website to dynamically adjust to the size of the screen on which

it is displayed (computer, tablet, smartphones). The website follows the project identity, in terms of logo, colors and typography in order to create a coherent link between all the planned communication tools.
The content of the website includes sections for:

- Description of project and its goals
- News, Events, Announcements and Press releases
- Newsletters
- Results generated by project & Progress of project
- Papers presented and Articles about the project
- Information on the partners including links companies websites
- Contacts information & Subscription service

All partners will supply information as a result of their work progress to be included at the website.
The initial website has been designed and developed on time. During the KO meeting a first presentation was given to all the partners of the initial structure of the website as well as the initial wireframe design. The structure and design were communicated to all partners requesting any further feedback or changes needed.
In terms of data privacy, the project website runs in compliance with the EU Regulation 2016/679 (General Data Protection Regulation - GDPR). Privacy policy and cookies policy are available for review and consent is requested by the visitor before he/she submits any type information on the website or any data is collected.
The original design and contents of the website can be seen in some of the figures below and also in Annex VII.

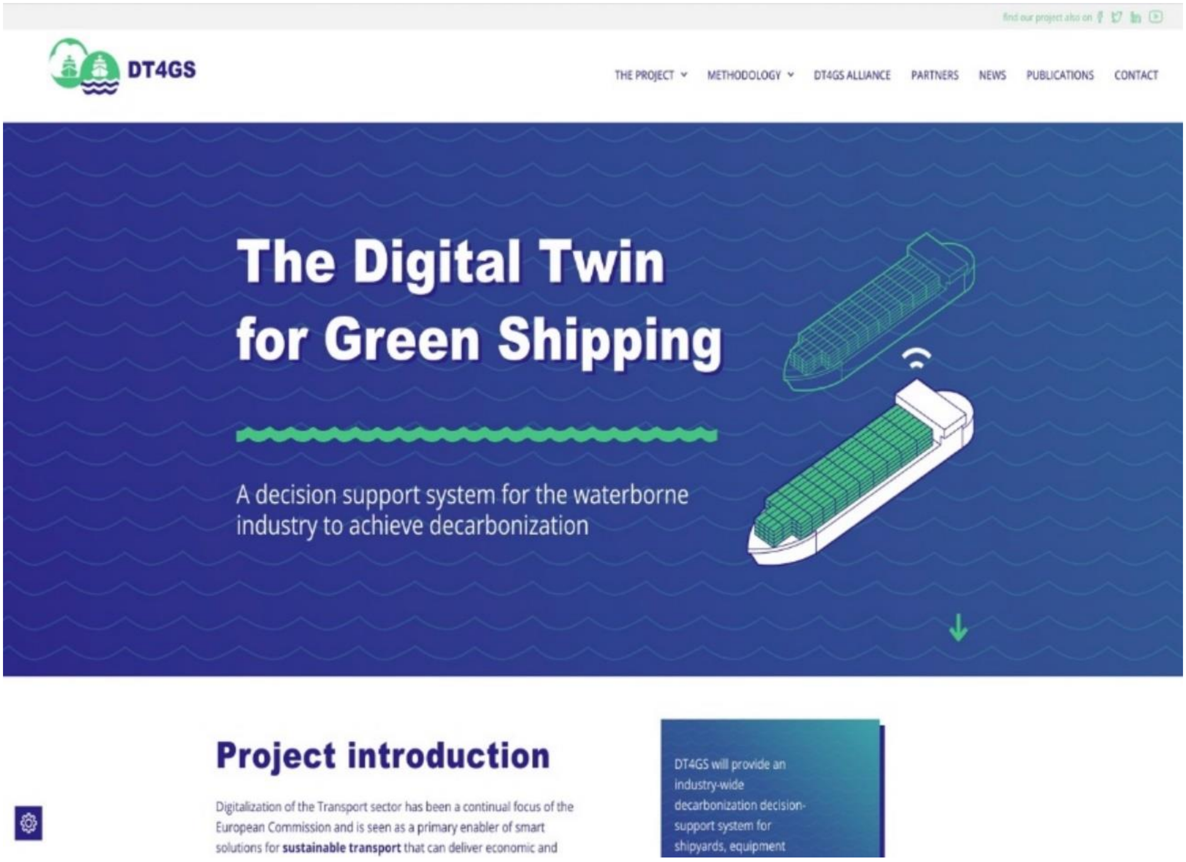

Figure 6 DT4GS Website online screenshot

Figure 7 DT4GS Website newsitems

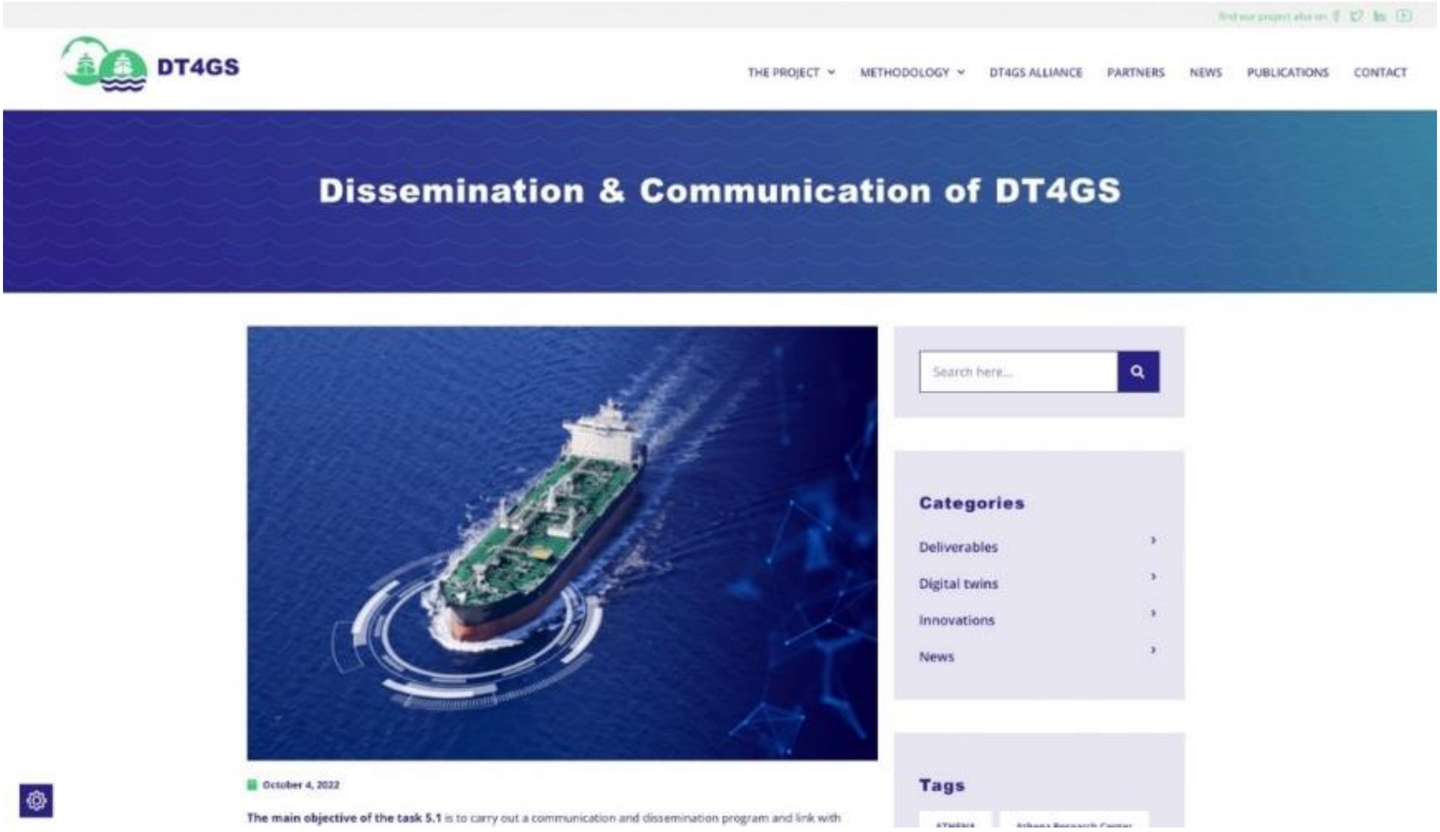

Figure 8 DT4GS Website newsitems

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Figure 9 DT4GS Website newsitems

3.4.1 Environment development and tools

The project website environment specifications/protocols as well as the tools used for its development are listed below:

Environment:

- PHP 7.0
- MySQL 5.6 Database
- cPanel
- Linux server

Tools:

- Adobe XD
- Zeplin
- Wordpress 6.0

3.5 Press releases

Table 4 Announcement of project official start: Press releases

Digital Twin for Green Shipping' project launches - Digital Ship - The world leader in maritime IT news (https://thedigitalship.com/component/k2/item/7894-digital-twin-for-green-shipping-project-launches)
'Digital Twin for Green Shipping' project launches – VPO (vpoglobal.com)
Consortium of 21 prominent Green Shipping stakeholders launches Research and Innovation project to supercharge shipping industry's drive towards zero emissions (ishipnet.com)
Consortium of 21 prominent Green Shipping stakeholders launches Research and Innovation project to supercharge shipping industry's drive towards zero emissions | Hellenic Shipping News Worldwide
Digital twin scheme aims to drive shipping to zero emissions - Marine Industry News
Digital twin scheme aims to drive shipping to zero emissions (boatshed.com)
Consortium of 21 prominent Green Shipping stakeholders launches Research and Innovation project to supercharge shipping industry's drive towards zero emissions - Maritime Shipping News (maritime-network.com)
Digital Twin for Green Shipping – ATHENA RC (https://www.athenarc.gr/en/news/digital-twin-green-shipping)
Fundación Valenciaport participates in the DT4GS project, focused on ecological and intelligent maritime transport – Fundacion Valencia (https://www.fundacion.valenciaport.com/en/news-events/2022/08/fundacion-valenciaport-participates-in-the-dt4gs-project-focused-on-ecological-and-intelligent-maritime-transport/)
Open collaboration and open Digital Twin infrastructure for Green Smart(DT4GS) – VLTN(https://vltn.be/en/projects/dt4gs)
DT4GS Press Release - DT4GS, the new European funded project to supercharge shipping industry's drive towards zero emissions, has started! – WEGEMT(http://www.wegemt.com/dt4gs-press-release/)

3.6 Project Events

Consortium partners' events and stakeholders' events will be also an important forum for DT4GS project promotion. Partners' were asked at beginning of the project start to propose concrete dissemination actions, to test ideas, share knowledge and best practices as well as to discuss future steps in their own events and related stakeholders' one. In the first event, which took place in Brussels(26-30 September), RINA-C attended the conference (EUSEW) concerning the "Renewable and low carbon fuels: scaling-up for sustainable aviation and waterborne transport". The main topics discussed beyond the green transition were the importance of digitalization and the subsequent development of digital platforms to unlock the potential provided by the vast amount of available data and the active involvement of citizens and SMEs (Annex II).

The projects events are key piece on the implementation of the communication and dissemination strategy of DT4GS. Planned events targeting different stakeholders will aim at:

- Presenting DT4GS results, conclusions and recommendations;
- Providing input and feedback for the project's view and activities;
- Looking for validation of the content, endorsement of results and influence the project outcomes;
- Fostering exploitation and implementation of DT4GS results;
- Discussing context specific issues ;
- Helping to define recommendations ;
- Ensuring coherence and achieve harmonization of measures uptake among EU countries.

Four workshops and at least 4 events are planned to be organised during the project life at specific phases of the project development.

i. First Workshop: The first workshop (planned for Month 4) was organized on the 6th of October by consortium partner, DANAOS. The purpose of the workshop was to present the DT4GS Strategy and validate related impact assessment indicators (KPIs), gathering end-user requirements and feedback. The targeted audience was Shipping Companies , Scientific Community, Industry and SMEs, potential end-users (port operators), Policy Makers EC. The 1st Workshop of DT4GS project took place in Piraeus, Greece on the 6th October 2022, with the participation of more than 40 people (physically and online).The project Coordinator, Georgia Tsiochantari (INLECOM) and Mr. Takis Katsoulakos (INLECOM), opened the day by welcoming the participants and gave an overview of the project including the concept and aims and highlighting its preliminary results and expected outcomes. Lively and fruitful discussion followed on the application of the Digital Twin technology in the project demonstrators. Closing the day, it was made a summary of the Workshop and its findings, thanking all for their participation and active involvement, while inviting them to stay tuned, follow and contribute to the project's progress. (Figure 11 Announcement of 1st Workshop at Danaos offices(M4) & Figure 12 DT4GS 1st Workshop at Danaos offices(M4), Annex IV: DT4GS 1ST WORKSHOP AT DANAOS OFFICES)
ii. Second Workshop: The second workshop (planned for Month 14) will be organized in order to present the GS Operational Optimisation DT and feedback from the related stakeholders on the shipping DT value. It will be hosted by INLECOM and the targeted audiences are: Scientific Community and project representatives (40), Port-related companies and stakeholders (70).
iii. Third Workshop: The third workshop (planned for Month 20) will be organized in order to present the DT4GS Conference involving international actors, to showcase the project implementation, focusing on zero-emission shipping Decision Support System (retrofit / new build) including interactive presentations and system demonstrations to potential up-takers and port operators. It will be hosted by FV/RINA and the targeted audiences are: Potential end- users(ship, ports, operators, Equipment producers shipyards) (200), Policy Makers, EC (10) Scientific Community (30), Companies, SMEs and start-ups (35).
iv. Fourth Workshop: The fourth workshop is planned for month 28.

3.7 External events

i. Waterborne Technology Platform

The DT4GS project was presented to the delegates of the Waterborne TP (https://www.waterborne.eu) Industry Research Advisory Groups (IRAGs) that met in Brussels on 26th & 27th of October 2022. The IRAGs are the main discussion groups of the Waterborne TP on matters related to technical RD&I, they define the research priorities of the association prepare the technological roadmap and give advice to the Waterborne TP Alignment group. The project was presented by WEGEMT with the support of Foundation Valencia Port (both organizations are members of the DT4GS consortium). The presentation highlighted the key aims and objectives, the methodology as well as the approach adopted by the DT4GS project. It attracted the attention of the participating delegates and triggered a fruitful discussion, where Dr. Ioannis Ergas (Research Director at WEGEMT) and Mr. Jorge Lara Lopez (Chairman of the Waterborne TP Ports & Logistics Group) answered a number of questions raised by the delegates,disseminated appropriate results of the project and also invited the participating organizations to join the DT4GS Alliance and create synergies between DT4GS and the EU funded projects that they participate to maximize impact.

ii. Open Simulation Platform Conference 2022 (OSP)

On the meeting that was held on the 28th of September between DT4GS Consortium and DNV, DT4GS received an invitation as presenter to the annual conference of the Open Simulation Platform. The Open Simulation Platform (OSP)[1] is a set of software tools and model interfaces that enable model exchange and collaborative simulations. The OSP was initiated through a MoU signed in 2017 and confirmed in 2018 by a partner agreement between **DNV GL, Kongsberg Maritime, SINTEF, NTNU**. A Joint Industry Project was launched in Q2 2018 and formally started with **20 additional partners** in Q3 2018.

The "Open Simulation Platform Conference 2022"[2] was held at the NMK Norwegian Maritime Competence Center in Ålesund, Norway on 15th of November 2022. It consisted of three sessions. The first session focused on OSP status and experience sharing. The second session was a technical session, focusing on usability and new developments. The third session was a hands-on workshop, using the OSP. The DT4GS was represented in the first session of the conference with two presentations, by INLECOM as Project Coordinator and KONNECTA, as leader of the infrastructure development (WP2 Leader). **INLECOM,** represented by Mr. Anargyros S. Mavrakos, presented "overview of the Digital Twin for the Green Shipping (DT4GS)" project which displayed the project's ambition to investigate the impact of digital Twin technologies, to the endeavour of green zero emission shipping by 2050, as dictated by the EU's strategy on the energy. These technologies are expected to optimize operations and facilitate more efficient coordination of the decarbonization actions among the whole waterborne industry stakeholders. Dr. Antonis Antonopoulos presented for **KONNECTA** aspects of the work conducted within DT4GS project, entitled: "Simulation Models Orchestration using Knowledge Graphs for the Generation of a Shipping Digital Twin". Besides the presentation of the DT4GS, the Open Simulation Platform was analytically showcased, including an introduction to the usage of" OSP as an enabler" for the Simulation- and data-driven development in the maritime industry (by SINTEF). After that a use case of co-simulation regarding the "Effect of Energy Management Strategy on Battery- Hybrid Ferry Performance" was presented (by DAMEN), as well as the "Evaluation of reliability and applicability of digital model based on co-simulation platform for virtual commissioning of the integrated controller for LNG carrier ship" (by KSOE Digital Technology), "Integrated Simulation sandbox and Scalable Power System Simulation" (by SINTEF).

In the second session technical matters were discussed, such as the "Interoperability and running FMUs with special constraints" (by Kongsberg Maritime), the "Usage of libcosim APIs" (by DNV), the "farn" open-source case generator (by DNV) and the "Assurance of Simulation Models – just another time thief, or pathway to sufficient quality" (by DNV).At the workshop (third session) participants, including INLECOM's and KONNECTA's representatives, conducted a 5-stage tutorial-exercise, building up a simple model of a vessel and running simulations to navigate it along a given trajectory using vessel's DP system. For the tutorial, the major components of OSP, namely OSP validator and cosim v.0.7.0 were used along with some OSP Maritime Reference Models.

[1] https://opensimulationplatform.com/

[2] https://opensimulationplatform.com/conference2022

Table 5 External events/ Conferences

Event / Fair	Location	In-Person / Hybrid / Virtual	Date(s) of event	key dates (for registration, abstact submissions etc.)	Opportunity (e.g. stand, speaker, etc.)	Link(s)	Comments
Baltic Ports and Shipping	Palanga, Lithuania	In-Person	27/09/2022 - 29/09/2022		Stand in the exhibition area; attendance as delegate	http://www.transportevents.com/ForthcomingEventsdetails.aspx?EventID=EVE180	
2nd Hellenic Maritime Forum	Athens, Greece	In-Person	18/10/2022 - 19/10/2022		Exibition stand and speaker opportunities possible	https://hellenicmaritimeforum.com/	
Greenport Cruise & Congress	Zeebrugge, Belgium	In-Person	18/10/2022 - 20/10/2022		Speaking opportunities possible; stand possibilites	https://www.portstrategy.com/greenport-cruise-and-congress?navCode=200	for inquiries : congress@greenport
Intermodal Europe 2022	Amsterdam, The Netherlands	In-Person	08/11/2022 - 10/11/2022		Exhibition stand; no speaker opportunities	https://www.intermodal-events.com/en/home.html	
Ship Navigation and Voyage Optimization Conference 2022	Athens, Greece	In-Person	15/11/2022 - 16/11/2022				
Transport Research Arena (TRA)	Lisbon, Portugal	In-Person	14/11/2022 - 17/11/2022		Stand; Demo area to exhibit novel technologies or solutsions	https://traconference.eu/	
Hamburg Maritime Forum	Hamburg, Germany	In-Person	29/11/2022 - 30/11/2022		Exibition stand and speaker opportunities possible	https://hamburgmaritimeforum.com/	
PLATINA3 Stage Series	TBD	TBD	TBD				
GreenTech for Ports and Terminals Conference 2023	Hamburg, Germany	In-Person	2/22/2023				
The Smart Digital Ports of the Future conference 2023	Netherlands	In-Person	16/05/2023 -17/05/2023				
OSP conference	Norway	In-Person	11/15/2022				

Table 6 C&D , Actions & KPIs

Objective	C&D channels	Actions	KPIs
Create a business-oriented image of the project and raise awareness of the benefits of the DT4GS project within the targeted communities and the general public	Corporate identity	Development of the overall project design, templates, presentations, etc.	Project design completed and templates available to partners M1
	Project website	Website creation and continuous update	DT4GS website online – 500 unique visits/month expected by the end of the project
	Social media	LinkedIn and Twitter presence	By the end of the project:.300 contacts in LinkedIn 200 followers in Twitter
	Public dissemination materials	Creation of brochures, posters, white papers, footage/videos, etc. Scientific publications	At least: 1 project brochure, 1 poster/rollup per partner, 1 white paper 2 project videos, 4 scientific publications
	Press material	Creation of press-releases templates, writing press releases and articles	At least: 5 press releases, 5 articles in magazines
	Events	Stakeholder workshops with CI operators and institutional stakeholders	Two workshops in Piraeus M4 and Brussels M14
		DT4GS Conference, society in general (local, regional and national institutions, entrepreneurs)	Self-organised: 1 conference in Europe attended by 150+ participants M18 including video recordings for keynote speakers
To disseminate and promote project activities among targeted stakeholders	Online marketing	Website search engine optimization, for community building, use web analytics	Continuous work, at least 2 social media posts per week
	Newsletters	Regular publishing a dedicated newsletter and contributions to external newsletters	Newsletters: once every quarter 100 registered receivers by the project end
	Press campaigns	Press releases in diverse media; print, radio, press, TV…	At least 5 press releases
	Conferences	Participation in selected conferences	At least 10 presentations in conferences
Liaison activities	Workshops and roundtables	Co-organization of workshops and roundtables	At least 4 events

3.7.1 Project Clustering

DT4GS will proceed in direct contacts with several other projects and relevant initiatives, to share ideas and thoughts and good practices regarding Digital Twinning innovations. More specifically, the project will actively seek to perform networking and **liaise** with other relevant EU projects and initiatives to find synergies and complementarities. The strategy to be followed for creating a list of these projects, contacting them, and discussing eventual opportunities for collaboration has been established early in the project.

Objectives

- Establish and consolidate a discussion group to analyse the main achievements on DT of the project
- Share and exchange other on-going DT projects through key external presentations

- Raise awareness of the opportunities, barriers and needs of using DT in the waterborne sector
- Start defining potential relationships for future business models and uptake of feasible solutions in the market
- Foster knowledge transference between stakeholders to facilitate solutions fitted to final customer needs

Win-win relationship

- A group to build up a communication channel related to the status of the project
- Bring up the opportunity to subscribe to a newsletter and participate in its contents
- Participate in workshops, dissemination and related activities
- Networking to another related projects, companies, and initiatives developing similar activities to booster the
- Take up further actions in the future, raising awareness of the importance of DT models in decarbonization
- Future collaboration models in GS and DT
- Knowledge hub for future partnerships in funding and developments

3.8 Progress and monitoring of dissemination activities

The dissemination plan will be regularly assessed during the project runtime. Evaluation will take place on an annual basis where actual results will be compared with the planned activities and where the dissemination actions will be included in the dissemination plan.

3.8.1 Progress monitoring M01-M18

Planned activities for M01-M06

i. To launch the DT4GS website
ii. To set up the DT4GS social media channels
iii. To develop the initial version of dissemination materials
iv. To elaborate the guidelines for the communication and dissemination activities of the DT4GS project.

Completed activities for M01-M06

i. The initial website has been designed and developed on time(M3).
ii. The initial website mock-ups which were implemented online in two phases. In the first release all the public pages, except for the forum were published online. In the second release the forum, the file manager and all the features for registered users were implemented as well. The news and events section on the website will be constantly be updated with the latest events and news from DT4GS.

Figure 10 DT4GS Mock-Ups

iii. Engaged partners in D&C activities (ClickUp), (Annex VI: Clickup platform).
iv. Creation of a DT4GS flyer (printed material) and will be used in any conference attended by a consortium partner. It will be used as a specific communication strategy (message to the public etc.), and it is available on the project website.
v. The promotion of DT4GS Workshop at Danaos offices well disseminated throughout all social media account as requested on GA.

Figure 11 Announcement of 1st Workshop at Danaos offices(M4)

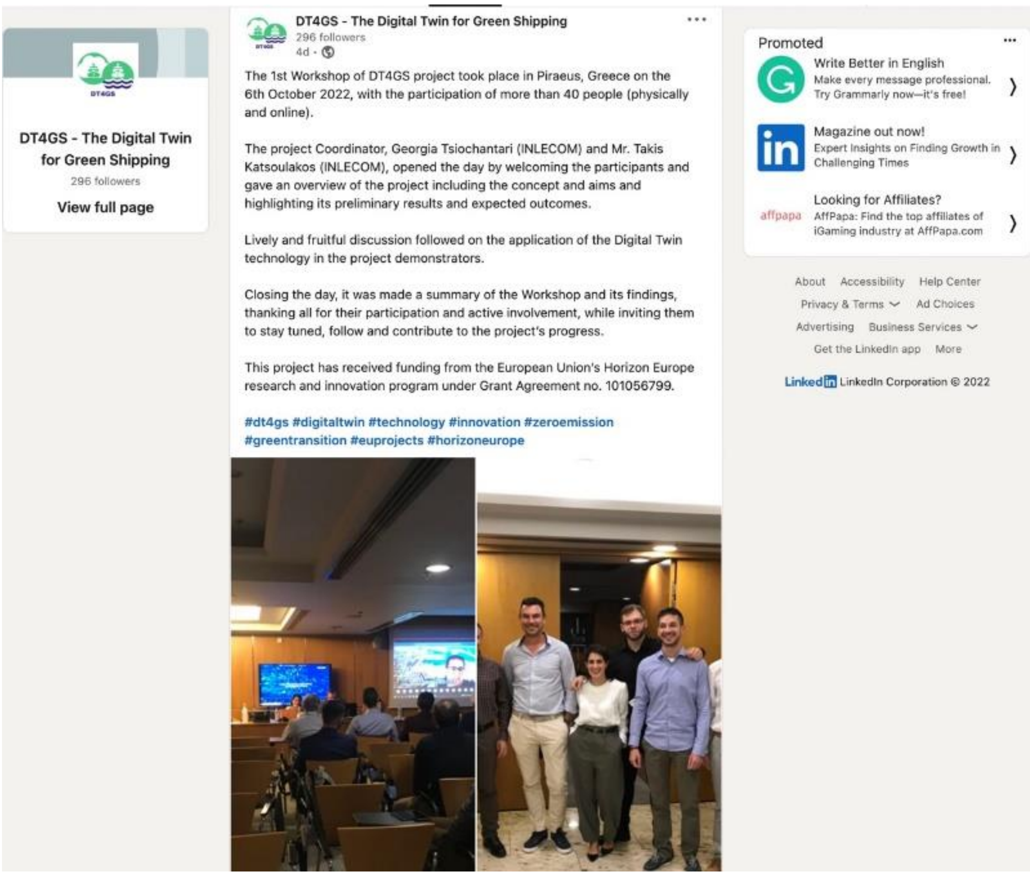

Figure 12 DT4GS 1st Workshop at Danaos offices(M4)

vi. All partners started reporting on the Click up platform and Wegemt has already published these reports on the project website which are until now more than 20 newsitems.
vii. LinkedIn account reached 303 followers out of 300 which is the goal till the end of project.
viii. For the purposes of task ST 5.1.2: "Perform networking, alliance across projects, and liaison activities", WEGEMT have prepared a spreadsheet to collect information from all Partners on any research projects, events, conferences and other activities where they are already involved or they are aware of (Table 5 External events/ Conferences, Table 7 Perform networking, alliance across projects, and liaison activities).

Table 7 Perform networking, alliance across projects, and liaison activities

Name of activity	Description
Sheet C&D KPIs	Initial Proposal used as a reference and shows the pertinent KPIs we need to satisfy
Sheet conferences & events to attend	Any information about potential conferences & events to attend and present the DT4GS work

Sheet Projects for Synergies	Populated with the pertinent projects listed in the GA. a) add more projects to connect with (ideally recent and active projects, not old) b) complete as much information as possible to help with the reporting c) the person(s) already linked with each project, needs to initiate the contact with that project and WEGEMT will coordinate the actions to take it further.
Sheet Communication	Any information about a communication done or are planning to do related to our DT4GS project
Sheet Dissemination	Any information about dissemination you have done or are planning to do related to our DT4GS project

<u>Planned activities for M07-M18</u>

i. To keep the DT4GS website up to date
ii. To keep the DT4GS social media channels up to date
iii. To keep the DT4GS Click Up Platform up to date
iv. To report on all the dissemination actions and events that the DT4GS consortium partners are engaged in during the period.
v. To update the dissemination plan with the latest communication and dissemination activities of the DT4GS project.

4 Conclusions

The primary objective of the DT4GS dissemination and communication plan is to define the core communication channels, activities, and target groups of the DT4GS project, to ensure an effective and efficient dissemination of the key project messages, activities, and results. Ensuring that project results are disseminated to key stakeholders and that stakeholders are given opportunities to engage in the project.

Effective dissemination and communication will enable DT4GS to maximise the impact of the results and findings in the project. By including a variety of communication channels and target groups in this strategy, the effectiveness of the key messages will also be increased.

As described in the sections above, the tools required to achieve dissemination and communication activities have been put in place and dissemination and communication information sessions held early on in the project will ensure that all project partners are aware of them. These communication channels will foster a mix of publications, digital communications, videos, and events. The dissemination activities will address the following main areas:

- Develop a coherent DT4GS identity.
- Create a prominent online presence of the DT4GS project that will reach a wide audience.
- Participate in and organise events to inform a wider audience about DT4GS.
- Organise activities to ensure uptake of DT4GS results by relevant stakeholders.
- The material produced during the project and the website will remain accessible at the end of the project to foster a later stage exploitation.

The plan of dissemination and communication will ensure that no opportunities to disseminate or communicate DT4GS project results are missed and indeed that they are conducted in a timely and well organised manner. This deliverable will be updated in its last version in M36.

References

- https://dt4gs.eu/
- https://www.facebook.com/dt4gs
- https://twitter.com/DT4GS?s=20&t=LShD04feDTz5IO6KAZbmMQ
- https://www.linkedin.com/showcase/86624621/admin/
- https://www.youtube.com/channel/UCTcQjq5eTg6ryrxb3gTJLLQ/featured
- https://opensimulationplatform.com/
- https://opensimulationplatform.com/conference2022

Annex I: PROJECT FLYER

DT4GS

The Digital Twin for Green Shipping

A decision support system for the waterborne industry to achieve decarbonization

DT4GS will provide an industry-wide decarbonization decision-support system for shipyards, equipment manufacturers, port authorities and operators, river commissions, classification societies, energy companies and transport/corridor infrastructure companies.

DTs can revolutionize the workings of the entire waterborne transport, from preliminary ship design right through to decommissioning across all the industries serving a ship's.

Impact

The results of the project will contribute to the acceleration of **green shipping transformation targets** in the short, medium term and **long term**.

- **i1** 20% reduction CO2e in the short term
- **i2** 20% improvement costs efficiency for GS solutions
- **i3** 55% reduction CO2e by 2030
- **i4** Zero-emission waterborne transport by 2050

The scientific breakthrough of the project is to go beyond the current state of the art

DT4GS has set the ambitious target of playing a key role in the realisation of the potential benefits of DTs towards zero-emission shipping.

- **Going beyond** current advancements in **ship operational optimisation**
- **Going beyond** current advancements in **ship design & testing**
- **Going beyond technology implementation** to address shipping's
- industry stakeholders to innovate
- **Going beyond a uni-sectoral focus**
- **Going beyond piecemeal approaches**

For more information about the DT4GS project, please feel free to contact us at **info@dt4gs.eu**

Partners

The DT4GS Consortium represents a multidisciplinary group composed of 21 partners from 10 countries within the European Union.

This project has received funding from the European Union's Horizon Europe research and innovation program under grant agreement no. 101056799

Annex II: RINA-C PRESENTED DT4GS IN EUSEW

Annex III: DT4GS LEAFLET

MISSION

The project will deliver an "Open Digital Twin Framework" for both shipping companies and the broader water-borne industry actors to tap into new opportunities made available through the use of Digital Twinning innovations to support smart green shipping applications in both the upgrade of existing ships, as well as the building of new vessels.

DIGITAL TWIN FOR GREEN SHIPPING

DT4GS

Funded by the European Union

This project has received funding from the Horizon Europe framework programme under Grant Agreement No 101056799

VISION

DT4GS will support ship operators in quantifying the effect of the different Decarbonization pathways on the vessel emission profile, technical and economic performance. The project aims to significantly contribute towards achieving 55% CO2 emissions' reduction from waterborne transport by 2030, in line with the ultimate target of zero emissions by 2050.

THE CONSORTIUM

Consortium of 21 prominent Green Shipping stakeholders launches an EU funded 36-month Research and Innovation project to supercharge shipping industry's drive towards zero emissions.

A **Multi-stakeholder green shipping Transition methodology supported DT** creating a collective capability of the waterborne industry to harmonise efforts and increase synergies between DT applications in shipping companies, shipyards, equipment manufacturers, class societies, ports, and policy makers.

A Green Ship Operational Optimisation DT (industry–ready by June 2024) will facilitate advanced decision support and increased automated control of assets and systems, built on top of a shared and common Waterborne Sector Data Space.

DT4GS LIVING LABS

The project Green Ship Operational Optimisation DT will be validated in 4 Living Labs (LLs) involving four shipping companies, with different types of ships. The project is designed as Shipping Companies (SC)-centred innovation ecosystem, for the systematic exploration, experimentation and evaluation of innovative ideas, scenarios, concepts and related technological artefacts in real life use cases involving SCs as co-creators of emerging ideas, and a real-world shipping DT deployment at sufficient scale to demonstrate implementation.

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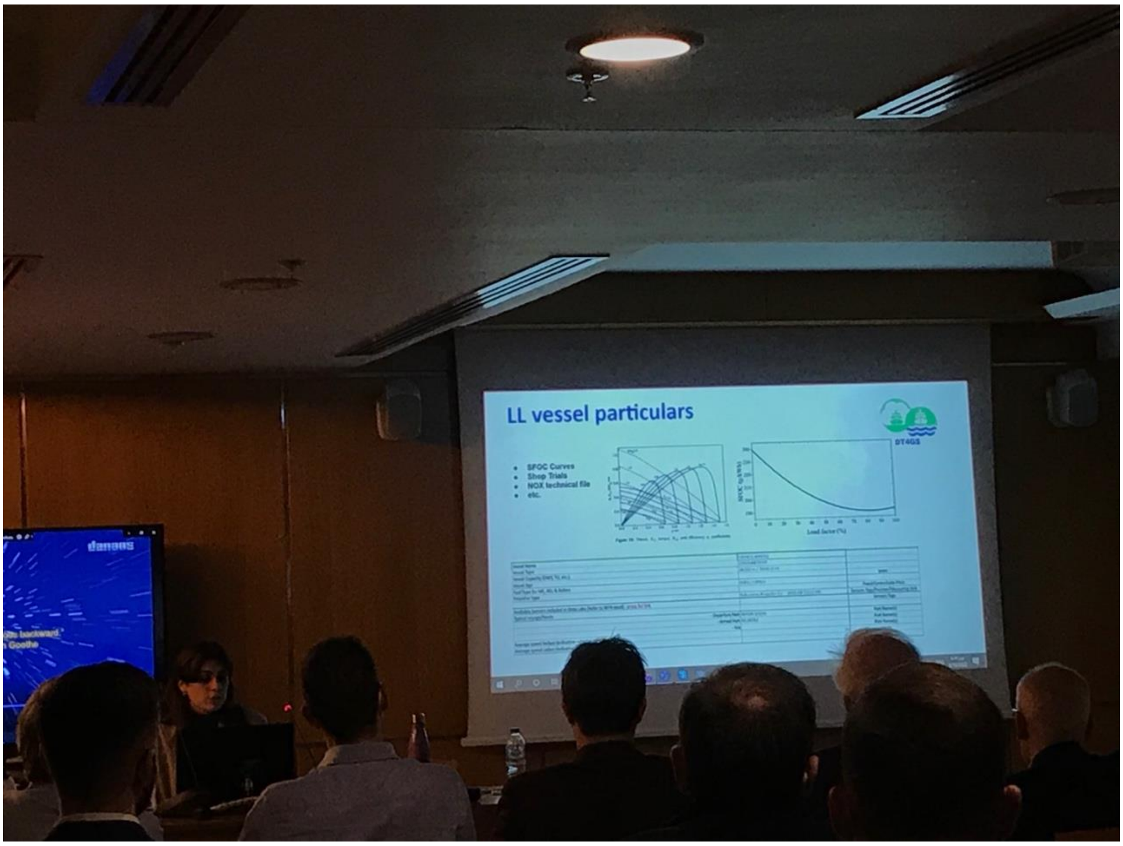
Annex IV: DT4GS 1ST WORKSHOP AT DANAOS OFFICES



Workshop Agenda

Start	End	Duration	Session	Speaker
17:00	17:15	00:15	Registration and Coffee	
17:15	17:25	00:10	Welcome speech from DANAOS	
17:25	17:40	00:15	DT4GS Overview	Takis Katsoulakos Georgia Tsiochantari
17:40	17:55	00:15	Demonstration of Initial DT4GS Platform	Antonis Mygiakis Antonis Antonopoulos
17:55	18:10	00:15	**LL1** EURONAV Tanker-Centric DT	Vasiliki Tzoumezi
18:10	18:25	00:15	Coffee Break	
18:25	18:40	00:15	**LL2** DANAOS Container-Centric DT	Fotis Oikonomou
18:40	18:55	00:15	**LL3** BALEARIA ROPAX-Centric DT	Jesus Angel Blanco Cedron
18:55	19:10	00:15	**LL4** STARBULK Bulk-Centric DT	George Mantalos
19:10	19:40	00:30	Roundtable Discussion	
19:40	20:10	00:30	Evening Beverages	

NOTE: Start and End time in local (GR) time

Annex V: DT4GS Initial planning of posts

MM	WEEK STARTING	PARTNER	TYPE OF POST	SUGGESTED TOPIC FOR POST	Post No
1 Jun-22	06/06/2022	01 INLE	Generic Posts	Short introduction of partner, why do they participate in DT4GS and why is DT4GS important for INLE?	1
	06/06/2022	01 INLE	Generic Posts	Short story on: What problems will DT4GS address?	2
	06/06/2022	01 INLE	Generic Posts	Short story on: Which results DT4GS wants to achieve? (focus on impact)	3
	07/06/2022	02 CEA	Generic Posts	Short introduction of partner, why do they participate in DT4GS and why is DT4GS important for CEA?	4
	10/06/2022	03 KNT	Generic Posts	Short introduction of partner, why do they participate in DT4GS and why is DT4GS important for KNT?	5
	14/06/2022	04 RINA-C	Generic Posts	Short introduction of partner, why do they participate in DT4GS and why is DT4GS important for RINA-C?	6
	20/06/2022	04.1 RINA-S	Generic Posts	Short introduction of partner, why do they participate in DT4GS and why is DT4GS important for RINA-S?	7
	22/06/2022	05 VLTN	Generic Posts	Short introduction of partner, why do they participate in DT4GS and why is DT4GS important for VLTN?	8
	24/06/2022	06 DAN	Generic Posts	Short introduction of partner, why do they participate in DT4GS and why is DT4GS important for DAN?	9
	27/06/2022	07 VF	Generic Posts	Short introduction of partner, why do they participate in DT4GS and why is DT4GS important for VF?	10
	28/06/2022	08 WEG	Task Related Posts	**T5.1** Dissemination & Communication(short story)	11
	29/06/2022	08 WEG	Generic Posts	Short introduction of partner, why do they participate in DT4GS and why is DT4GS important for WEG?	12
	31/06/2022	13 BAL	Task Related Posts	**T4.4** LL3. Baleària ROPAX-centric DT(short story)	13
	31/06/2022	09 IWT	Generic Posts	Short introduction of partner, why do they participate and why is DT4GS important for IWT?	14
2 Jul-22	01/07/2022	19 Enav	Task Related Posts	**T1.1** DT4GS Value-oriented Analysis in enabling Shipping Decarbonisation(short story)	15
	01/07/2022	10 CNR	Generic Posts	Short introduction of partner, why do they participate in DT4GS and why is DT4GS important for CNR ?	16
	04/07/2022	07 VF	Task Related Posts	**T4.1** LLs Detailed Planning and KPIs - Support and Learning activities(short story)	17
	04/07/2022	11 SP	Generic Posts	Short introduction of partner,why do they participate in DT4GS and why is DT4GS important for SP?	18
	04/07/2022	01 INLE	Sub Task Related Posts	**ST6.1.2** Technical and Strategic Management(define a project manager)	19
	05/07/2022	21 FINC	Task Related Posts	**T1.2** DT4GS modelling framework for ship operational performance optimisation including ship efficiency innovations(short story)	20
	06/07/2022	12 TUD	Generic Posts	Short introduction of partner, why do they participate in DT4GS and why is DT4GS important for TUD?	21
	07/07/2022	01 INLE	Task Related Posts	**T6.1** Project Coordination and Technical Management(short story)	22
	08/07/2022	07 VF	Task Related Posts	**T1.5** GS collaboration models with port and broader stakeholders and GS trajectories(short story)	23
	08/07/2022	13 BAL	Generic Posts	Short introduction of partner, why do they participate and why is DT4GS important for BAL?	24
	11/07/2022	02 CEA	Task Related Posts	**T1.3** DT4GS Modelling Framework for comparative analysis and performance modelling of emerging Green Ship(short story)	25
	11/07/2022	19 Enav	Task Related Posts	**T4.2** LL1 EURONAV Tanker-centric DT(short story)	26
	11/07/2022	14 ATH	Generic Posts	Short introduction of partner, why do they participate and why is DT4GS important for ATH?	27
	13/07/2022	07 VF	Task Related Posts	**T5.2** DT4GS Cluster(short story)	28
	14/07/2022	15 GLM	Generic Posts	Short introduction of partner, why they participate and why is DT4GS important for GLM?	29
	15/07/2022	12 TUD	Task Related Posts	**T1.4** Application of Digital Twins in the design and production of green autonomous vessels(short story)	30
	15/07/2022	16 StarB	Generic Posts	Short introduction of partner, why do they participate and why is DT4GS important for StarB?	31
	18/07/2022	17 AXON	Generic Posts	Short introduction of partner and why do they participate in DT4GS?	32
	19/07/2022	06 DAN	Task Related Posts	**T4.3** LL2 DANAOS Containership-centric DT(short story)	33
	20/07/2022	18 IBM	Generic Posts	Short introduction of partner, why do they participate in DT4GS and why is DT4GS important for IBM?	34
	20/07/2022	05 VLTN	Task Related Posts	**T6.2** Quality Assurance and Risk Management (Inform us about quality plan,assurance, risk management)	35
	21/07/2022	01 INLE	Task Related Posts	**T5.3** DT4GS Innovation Management and Exploitation Strategy(short story)	36
	22/07/2022	19 Enav	Generic Posts	Short introduction of partner, why do they participate and why is DT4GS important for Enav?	37
	25/07/2022	20 RMD	Generic Posts	Short introduction of partner, why do they participate in DT4GS and why is DT4GS important for RMD?	38
	27/07/2022	16 StarB	Task Related Posts	**T4.5** LL4 STARBULK Bulkers-centric DT(short story)	39
	28/07/2022	01 INLE	Task Related Posts	**T6.3** Data Management(info about the data that will be generated within DT4GS activities)	40
	29/07/2022	21 FINC	Generic Posts	Short introduction of partner, why do they participate and why is DT4GS important for FINC?	41
	29/07/2022	10 CNR	Task Related Posts	**T3.1** DT4GS knowledge Hub(short story)	42
3 Aug-22	01/08/2022	06 DAN	Task Related Posts	**T2.4** DT4GS Model Blueprints and Open Model Library(short story)	43
	05/08/2022	18 IBM	Task Related Posts	**T2.5** DT4GS Headquarters, Edge and Orchestration Infrastructure(short story)	44
	08/08/2022- 24/08/2022			**Summer Break**	
	26/08/2022	08 WEG	Workshop Announcement	Promotion - Announcement of Workshop to be organized in M4	45
	28/08/2022	01 INLE	Task Related Posts	**T2.1** Transferable DT4GS architecture(short story)	46
	31/08/2022	01 INLE	Sub Task Related Posts	**ST6.3.1** Data Management Plan(short description of initial version)	47
4 Sep-22	01/09/2022	05 VLTN	Deliverable Related Posts	**D6.2** Quality Plan and Monitoring (short story)	48
	02/09/2022	03 KNT	Task Related Posts	**T3.5** DT4GS-DT User Interface(short story)	49
	12/09/2022	21 FINC	Task Related Posts	**T2.2** DT4GS (Green Shipping) Dataspace(short story)	50
	19/09/2022	03 KNT	Task Related Posts	**T2.3** Modelling, Analysis, Simulation, and Optimisation Tools(short story)	51
	25/09/2022	06 DAN	Task Related Posts	**T3.2** Ship and company specific DT configuration and Deployment support services(short story)	52
	30/09/2022	06 DAN	Task Related Posts	**T3.3** GS Operational Optimisation DT(short story)	53
5 Oct-22	03/10/2022	21 FINC	Task Related Posts	**T3.4** Zero-emission shipping Decision Support System (retrofit / new build) (short story)	54
	10/10/2022	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	55
	17/10/2022	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	56
	27/10/2022	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	57
6 Nov-22	04/11/2022	01 INLE	Sub Task Related Posts	**ST6.3.1** Data Management Plan(short description of procedure for data collection)	58
	15/11/2022	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	59
	20/11/2022	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	60
	30/11/2022	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	61
7 Dec-23	01/12/2022	19 Enav	Deliverable Related Posts	**D1.1** DT4GS Value-oriented Analysis in enabling Shipping Decarbonisation(short story)	62
	10/12/2022	01 INLE	Deliverable Related Posts	**D5.4** DT4GS Innovation Management and Exploitation Strategy v1(short story)	63
	15/12/2022	08 WEG	Deliverable Related Posts	**D5.1** Dissemination & Communication v1(short story)	64
	20/12/2022	01 INLE	Deliverable Related Posts	**D6.3** Data Management Plan and GDPR Compliancy v1 (short story)	65
	22/12/2022- 08/01/2023			**Christmas Break**	
8 Jan-23	10/01/2023	01 INLE	Sub Task Related Posts	**ST6.2.1** Project Coordination (info about financial and administrative management of the project)	66
	15/01/2023	01 INLE	Deliverable Related Posts	**D6.1** Project Management Handbook and periodic Management reports(short story)	67
	20/01/2023	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	68
	31/01/2023	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	69
9 Feb-23	06/02/2023	12 TUD	Task Related Posts	**T1.6** Comprehensive DT-enabled design methodology for zero emission shipping(Short story)	70
	10/02/2023	08 WEG	Generic Posts	DT4GS stakeholders' Cluster with 20+ shipping companies, 10+ ports, 10+ shipyards and equipment manufacturers, 10+ Universities (DISSEMINATION SCALE UP)	71
	15/02/2023	21 FINC	Task Related Posts	**T1.2** DT4GS modelling framework for ship operational performance optimisation including ship efficiency innovations(progress)	72
	24/03/2023	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	73
	25/03/2023	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	74
	30/03/2023	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	75
10 Mar-23	01/03/2023	21 FINC	Deliverable Related Posts	**D2.2** DT4GS (Green Shipping) Dataspace v1 (short story)	76
	06/03/2023	19 Enav	Task Related Posts	**T1.1** DT4GS Value-oriented Analysis in enabling Shipping Decarbonisation(final output)	78
	10/03/2023	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	79
	20/03/2023	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	80
	27/03/2023	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	81
11 Apr-23	**03/04/2023 - 17/04/2023**			**Easter Break**	
	28/04/2023	08 WEG	Workshop Announcement	Promotion - Announcement of Workshop to be organized in M14	82
12 May-23	05/05/2023	21 FINC	Task Related Posts	**T1.2** DT4GS modelling framework for ship operational performance optimisation including ship efficiency innovations (progress)	83
	15/05/2023	08 WEG	Sub Task Related Posts	**ST5.1.1** Dissemination & Communication material and website(progress)	84
13 Jun-23	01/06/2023	21 FINC	Deliverable Related Posts	**D1.2** DT4GS modelling framework for ship operational performance optimisation including	85
	09/06/2023	06 DAN	Deliverable Related Posts	**D2.6** DT4GS Model Blueprints and Open Model Library v1 (short story)	86
	15/06/2023	10 CNR	Deliverable Related Posts	**D3.1** DT4GS knowledge Hub v1 (short story)	87
	20/06/2023	06 DAN	Deliverable Related Posts	**D3.3** GS Operational Optimisation DT v1 (short story)	88
14 Jul-23	05/07/2023	02 CEA	Task Related Posts	**T1.3** DT4GS Modelling Framework for comparative analysis and performance modelling of emerging Green Ship(progress)	89
	14/07/2023	12 TUD	Task Related Posts	**T1.4** Application of Digital Twins in the design and production of green autonomous vessels(progress)	90
	21/07/2023	07 VF	Task Related Posts	**T1.5** GS collaboration models with port and broader stakeholders and GS trajectories (progress)	91
	29/07/2023	01 INLE	Deliverable Related Posts	**D2.1** Transferable DT4GS architecture(short story)	92
15 Aug-23	04/08/2023	13 BAL	Task Related Posts	**T4.4** LL3. Baleària ROPAX-centric DT(progress)	93
	09/08/2023 - 23/08/2023			**Summer Break**	
16 Sep-23	01/09/2023	03 KNT	Task Related Posts	**T2.3** Modelling, Analysis, Simulation, and Optimisation Tools(progress)	94
	09/09/2023	08 WEG		Promotion - Announcement of Workshop to be organized in M20	95
	11/09/2023	01 INLE	Sub Task Related Posts	**ST5.3.1** Assessment of market potentials for each project output on an EU level as well as on a global level(progress)	96
	22/09/2023	05 VLTN	Task Related Posts	**T6.2** Quality Assurance and Risk Management(progress infos)	97
	29/09/2023	06 DAN	Task Related Posts	**T2.4** DT4GS Model Blueprints and Open Model Library(progress)	98
17 Oct-23	02/10/2023	18 IBM	Task Related Posts	**T2.5** DT4GS Headquarters, Edge and Orchestration Infrastructure(progress)	99
	10/10/2023	06 DAN	Task Related Posts	**T4.3** LL2 DANAOS Containership-centric DT(progress)	100
	23/10/2023	16 StarB	Task Related Posts	**T4.5** LL4 STARBULK Bulkers-centric DT(progress)	101
18 Nov-23	01/11/2023	07 VF	Task Related Posts	**T4.6** LL5 Extended Industry LL(short story)	102
	06/11/2023	06 DAN	Task Related Posts	**T3.2** Ship and company specific DT configuration and Deployment support services(progress)	103
	15/11/2023	21 FINC	Task Related Posts	**T1.2** DT4GS modelling framework for ship operational performance optimisation including ship efficiency innovations(progress)	104
	20/11/2023	04 RINA-C	Task Related Posts	**T5.4** Capacity Building and Policy Recommendations(short story)	105
	29/11/2023	01 INLE	Sub Task Related Posts	**ST6.3.1** Data Management Plan(provide info about reviewed and revised versions)	106
19 Dec-23	01/12/2023	03 KNT	Deliverable Related Posts	**D2.4** Modelling, Analysis, Simulation, and Optimisation Tools v1(short story)	107
	10/12/2023	18 IBM	Deliverable Related Posts	**D2.8** DT4GS Edge and Orchestration Infrastructure v1(short story)	108
	20/12/2023	01 INLE	Deliverable Related Posts	**D5.5** DT4GS Innovation Management and Exploitation Strategy v2 (short story)	109

20	Jan-24	**21/12/2023- 05/01/2024**			**Christmas Break**	
		10/01/2024	07 VF	Task Related Posts	**T5.2** DT4GS Cluster(progress)	110
		29/01/2024	21 FINC	Sub Task Related Posts	**T2.2** DT4GS (Green Shipping) Dataspace(progress)	111
21	Feb-24	05/02/2024	01 INLE	Sub Task Related Posts	**ST1.6.1** Framework and Models Aggregator, methodology creation (progress)	112
		15/02/2024	10 CNR	Task Related Posts	**T3.1** DT4GS knowledge Hub(progress)	113
		20/02/2024	21 FINC	Task Related Posts	**T3.4** Zero-emission shipping Decision Support System (retrofit / new build) (progress)	114
22	Mar-24	04/03/2024	06 DAN	Task Related Posts	**T3.3** GS Operational Optimisation DT(progress)	115
		11/03/2024	08 WEG		Promotion - Announcement of 1st Workshop to be organized M24	116
23	Apr-24	**25/03/2024- 05/04/2024**			**Easter Break**	
		15/04/2024	14 ATH	Sub Task Related Posts	**ST6.3.2** Data Management Monitoring(info about correct monitoring and management)	117
24	May-24	10/05/2024	21 FINC	Task Related Posts	**T1.2** DT4GS modelling framework for ship operational performance optimisation including ship efficiency innovations(final outputs)	118
		13/05/2024	01 INLE	Task Related Posts	**T2.1** Transferable DT4GS architecture(final outputs)	119
		17/05/2024	12 TUD	Task Related Posts	**T1.4** Application of Digital Twins in the design and production of green autonomous vessels(final outputs)	120
25	Jun-24	05/06/2024	02 CEA	Task Related Posts	**T1.3** DT4GS Modelling Framework for comparative analysis and performance modelling of emerging Green Ship(final outputs)	121
		12/06/2024	02 CEA	Deliverable Related Posts	**D1.3** DT4GS Modelling Framework for comparative analysis and performance modelling of emerging Green Ship Energy solutions(short story)	122
		14/06/2024	07 VF	Task Related Posts	**T1.5** GS collaboration models with port and broader stakeholders and GS trajectories(final outputs)	123
		18/06/2024	08 WEG	Task Related Posts	**ST5.4.1** Capacity Building (message from the event in M24)	124
		20/06/2024	12 TUD	Deliverable Related Posts	**D1.4** Application of Digital Twins in design and production of new green autonomous vessels (short story)	125
		28/06/2024	08 WEG	Sub Task Related Posts	**ST5.1.2** Perform networking, alliance across projects, and liaison activities (subtask outputs)	126
26	Jul-24	01/07/2024	07 VF	Deliverable Related Posts	**D1.5** GS collaboration models with port and broader stakeholders and GS trajectories(short story)	127
		05/07/2024	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	128
		17/07/2024	08 WEG	Workshop Announcement	Promotion - Announcement of 2nd Workshop to be organized in M28	129
		25/07/2024	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	130
27	Aug-24	01/08/2024	21 FINC	Deliverable Related Posts	**D3.6** Zero-emission shipping Decision Support System (retrofit / new build) (short story)	131
		08/08/2024 - 26/08/2024			**Summer Break**	
28	Sep-24	01/09/2024	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	132
		10/09/2024	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	133
		15/09/2024	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	134
		20/09/2024	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	135
29	Oct-24	15/10/2024	08 WEG	Sub Task Related Posts	**ST5.4.1** Capacity Building (message from the event in M28)	136
		20/10/2024	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	137
		21/10/2024	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	138
		22/10/2024	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	139
30	Nov-24	05/11/2024	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	140
		06/11/2024	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	141
		07/11/2024	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	142
		29/11/2024	07 VF	Task Related Posts	**T4.6** LL5 Extended Industry LL(progress&pre final outputs)	143
31	Dec-24	10/12/2024	01 INLE	Deliverable Related Posts	**D5.6** DT4GS Innovation Management and Exploitation Strategy final version (short story)	144
		11/12/2024	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	145
		12/12/2024	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	146
		13/12/2024	04 RINA-C	Deliverable Related Posts	**D5.7** Capacity Building and Policy Reccomendations (short story)	147
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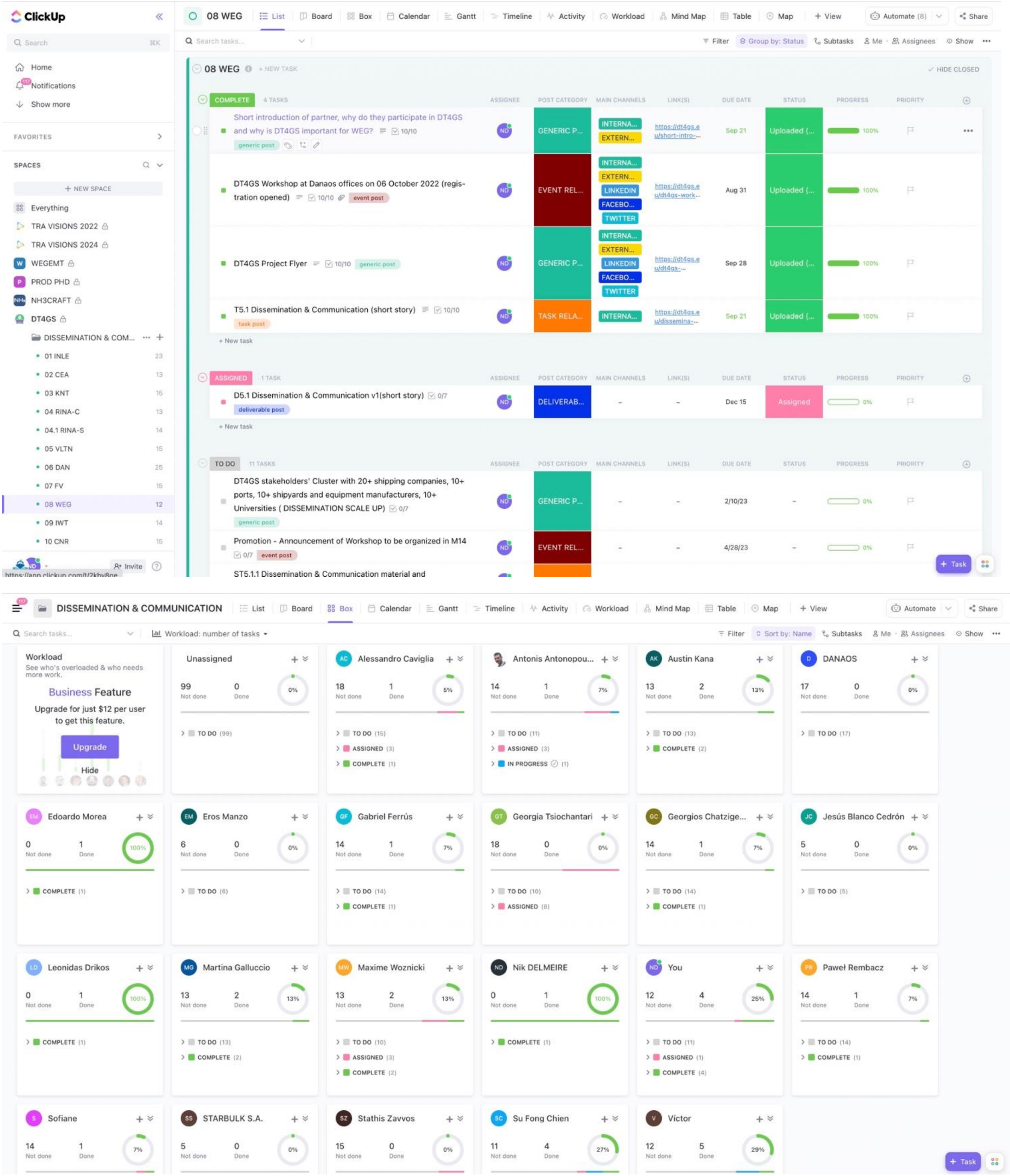
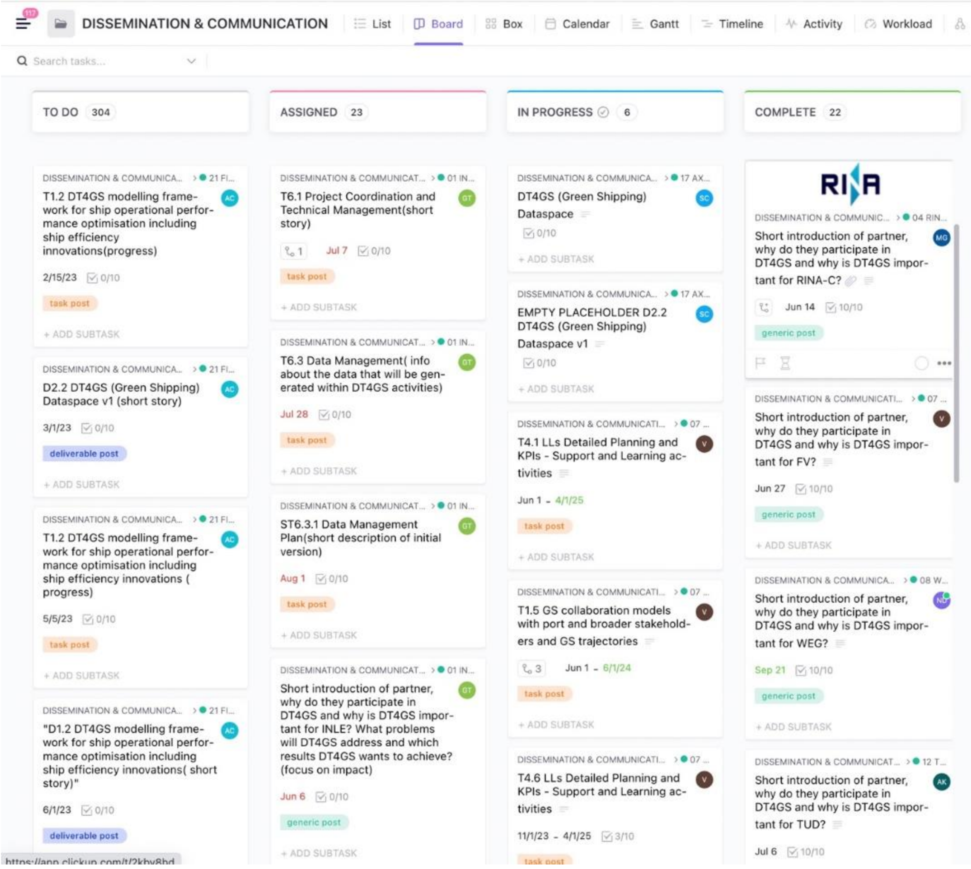
		20/12/2024	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	149
32	Jan-25	**23/12/2024 - 08/01/2025**			**Christmas Break**	
33	Feb-25	12/02/2025	19 Enav	Task Related Posts	**T4.2** LL1 EURONAV Tanker-centric DT(final outputs)	150
		18/02/2025	07 VF	Task Related Posts	**T4.1** LLs Detailed Planning and KPIs - Support and Learning activities (final outputs)	151
		20/02/2025	18 IBM	Task Related Posts	**T2.5** DT4GS Headquarters, Edge and Orchestration Infrastructure(final outputs)	152
		24/02/2025	07 VF	Sub Task Related Posts	**ST1.6.2** Methodology verification, validation, and packaging (report with lessons learned)	153
		28/02/2025	03 KNT	Task Related Posts	**T2.3** Modelling, Analysis, Simulation, and Optimisation Tools(final outputs)	154
34	Mar-25	03/03/2025	21 FINC	Deliverable Related Posts	**D2.3** DT4GS (Green Shipping) Dataspace v2(short story)	155
		05/03/2025	21 FINC	Task Related Posts	**T2.2** DT4GS (Green Shipping) Dataspace(final outputs)	156
		06/03/2025	13 BAL	Task Related Posts	**T4.4** LL3. Baleària ROPAX-centric DT(final outputs)	157
		07/03/2025	06 DAN	Task Related Posts	**T2.4** DT4GS Model Blueprints and Open Model Library(final outputs)	158
		10/03/2025	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	159
		12/03/2025	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	160
		13/03/2025	10 CNR	Task Related Posts	**T3.1** DT4GS knowledge Hub(final outputs)	161
		14/03/2025	06 DAN	Task Related Posts	**T4.3** LL2 DANAOS Containership-centric DT (final outputs)	162
		14/03/2025	16 StarB	Task Related Posts	**T4.5** LL4 STARBULK Bulkers-centric DT(final outputs)	163
		17/03/2025	06 DAN	Task Related Posts	**T3.2** Ship and company specific DT configuration and Deployment support services(final outputs)	164
		19/03/2025	03 KNT	Deliverable Related Posts	**D2.5** Modelling, Analysis, Simulation, and Optimisation Tools v2 (short story)	165
		21/03/2025	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	166
		24/03/2025	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	167
		26/03/2025	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	168
		28/03/2025	10 CNR	Deliverable Related Posts	**D3.2** DT4GS knowledge Hub v2(short story)	169
		31/03/2025	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	170
35	Apr-25	01/04/2025	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	171
		04/04/2025	00 Any Partner	Generic Posts	Activity reporting (Dissemination, Events and presentations, Work completed, Publications etc.)	172
		07/04/2025	03 KNT	Deliverable Related Posts	**D3.7** DT4GS-DT User Interface (short story)	173
		09/04/2025	06 DAN	Deliverable Related Posts	**D3.3** Ship and company specific DT Configuration and Deployment support services(short story)	174
		10/04/2025	06 DAN	Deliverable Related Posts	**D3.5** GS Operational Optimisation DT v2 (short story)	175
		06/04/2025	07 VF	Deliverable Related Posts	**D4.1** LLs Detailed Planning and KPIs - Support and Learning activities(short story)	176
		11/04/2025-23/04/2025			**Easter Break**	
		24/04/2025	01 INLE	Sub Task Related Posts	**ST6.3.1** Data Management Plan(provide info about reviewed and revised versions)	177
		28/04/2025	19 Enav	Deliverable Related Posts	**D4.2** LL1 EURONAV Tanker-centric DT (short story)	178
		29/04/2025	06 DAN	Deliverable Related Posts	**D4.3** LL2 DANAOS Containership-centric DT (short story)	179
		30/04/2025	13 BAL	Deliverable Related Posts	**D4.4** LL3 Baleària ROPAX-centric DT (short story)	180
		11/04/2025	16 StarB	Deliverable Related Posts	**D4.5** LL4 STARBULK Bulkers-centric DT (short story)	181
		12/04/2025	07 VF	Deliverable Related Posts	**D4.6** LL5 Extended industry LL (short story)	182
		13/04/2025	12 TUD	Deliverable Related Posts	**D1.6** Comprehensive DT-enabled design methodology for zero emission shipping(short story)	183
36	May-25	02/05/2025	21 FINC	Task Related Posts	**T3.4** Zero-emission shipping Decision Support System (retrofit / new build) (final outputs)	184
		03/05/2025	08 WEG	Deliverable Related Posts	**D5.2** Dissemination & Communication v2(short story)	185
		04/05/2025	01 INLE	Task Related Posts	**T5.3** DT4GS Innovation Management and Exploitation Strategy(final outputs)	186
		05/05/2025	07 VF	Deliverable Related Posts	**D5.3** DT4GS Cluster(short story)	187
		06/05/2025	03 KNT	Task Related Posts	**T3.5** DT4GS-DT User Interface(final outputs)	188
		07/05/2025	07 VF	Task Related Posts	**T5.2** DT4GS Cluster(final outputs)	189
		08/05/2025	04 RINA-C	Task Related Posts	**T5.4** Capacity Building and Policy Recommendations(focus on Policy Recommendation outputs)	190
		09/05/2025	05 VLTN	Task Related Posts	**T6.2** Quality Assurance and Risk Management(final outputs of plan)	191
		10/05/2025	01 INLE	Task Related Posts	**T6.3** Data Management(final outputs)	192

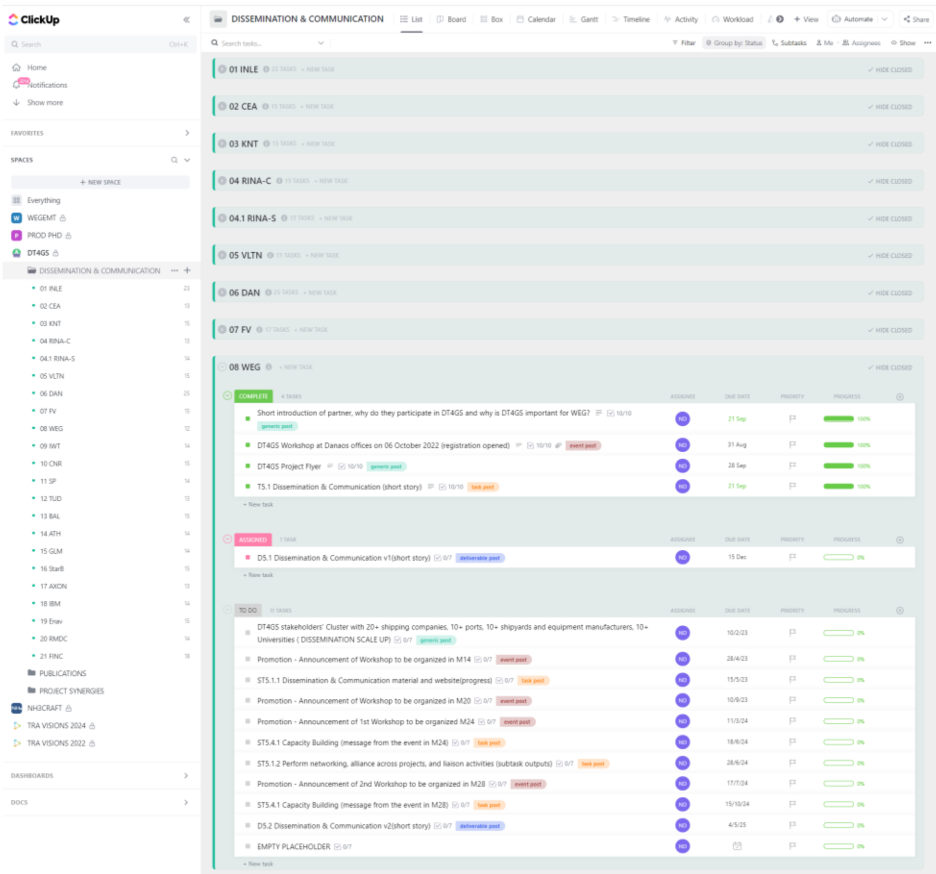
	Generic Posts
	Task Related Posts
	Sub Task Related Posts
	Deliverable Related Posts
	Holiday breakes
	Workshop Announcement

Annex VI: Clickup platform



Click Up screenshots





Click Up screenshots

Annex VII: DT4GS initial website design

See pages below

THE DIGITAL TWIN FOR GREEN SHIPPING

SITEMAP

Home
- *Project introduction*
- *Objectives and Impact (concise list)*
- *Get in touch (Call to action)*

The project
- *Objectives and Ambition*
- *Going beyond*
- *Impact*
- *Living Labs*

Methodology
- *Overall research approach*
- *Multidisciplinary approach*
- *Gender Dimension*
- *Open science approach*

Clustering

Partners
- *Partners list, w. competencies and project role*

News
- Single News 01
- Single News 02
- Single News ...

Publications

Contact

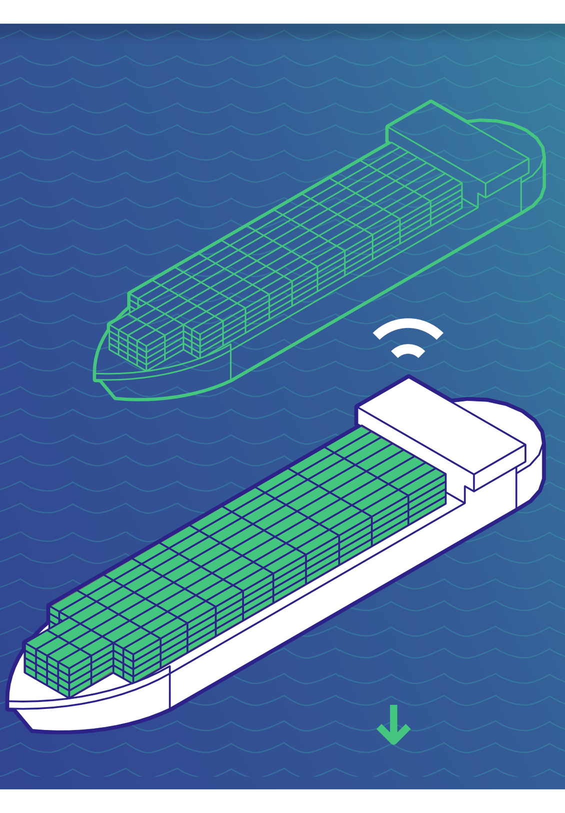
DT4GS

DT4GS

Logo colors update

The Digital Twin for Green Shipping

A decision support system for the waterborne industry to achieve decarbonisation

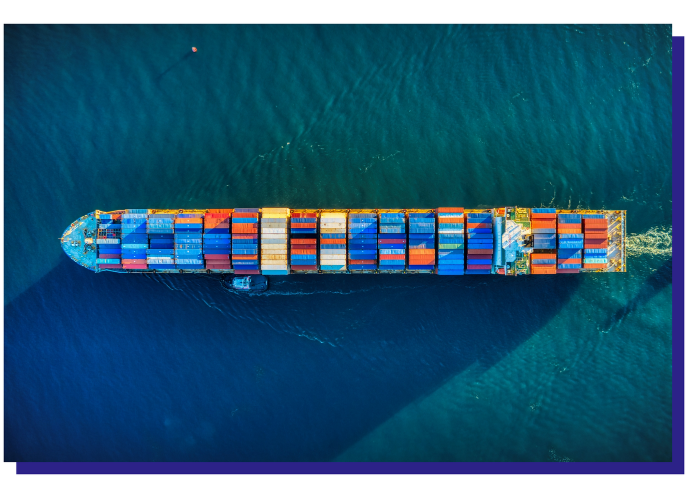


Project introduction

Digitalization of the Transport sector has been a continual focus of the European Commission and is seen as a primary enabler of smart solutions for **sustainable transport** that can deliver economic and societal benefits.

Digital Twins are realistic digital representations of physical artifacts, enabling improved insights for enhanced decision making, particularly in complex systems where DTs are employed for predicting outcomes and assessing "what-if" scenarios. This leads to **real-time optimization of processes** and operations and, ultimately, to unlocking value which is otherwise difficult to grasp through conventional means

DT4GS will provide an industry-wide decarbonisation decision-support system for shipyards, equipment manufacturers, port authorities and operators, river commissions, classification societies, energy companies and transport / corridor infrastructure companies.



The project will enable stakeholders in shipping to actively **embrace the full spectrum of Digital Twins innovations** to support **smart green shipping** in both the upgrade of existing ships, as well as the building of new vessels

Read all publications →

DTs can revolutionise the workings of the entire waterborne transport, from preliminary ship design right through to decommissioning across all the industries serving a ship's lifecycle

The DT4GS's strategic sector main impact objectives are to:

1 **Support shipping companies in achieving up to 20% reduction in CO2e with a 2026 horizon**, by developing and deploying real-time configurable DTs for ship and fleet operational performance optimisation in 4 Living Labs (LLs) involving shipping companies, with different types of ships, and establishing fully validated industry services for Green Shipping Operational Optimisation DTs expected to be adopted by 1000+ ships by 2030.

2 **Establish a comprehensive zero-emission shipping methodology** and support Virtual Testbed and Decision Support Systems that address new builds, retrofits and the shipping-port interface, comprising:

a. A DT4GS (Green Shipping) Dataspace for the broader shipping sector aligned with European data strategy15 and initiatives International Data Spaces association, The Big Data Value Association and GAIA-X by extending numerous Dataspace assets from reference projects (Table 1-2) particularly interoperability.

b. Simulation based solutions to retrofit ships, targeting 55% reduced CO2e reduction by 2030, promoting the implementation of new and economically viable European services and technologies (fuel cells and/or propulsion assist solutions) and assisting the EU's advancements in the green ship solutions market.

c. A smart green "new-build" reference design per vessel type, addressing the EC's target of zero emissions by 2050 and facilitating the development and implementation of regulations and policies at national and international level, including the development of standards for DT solutions for the broader sector.

d. Virtual Testbed services for reducing the cost of physical testing of GS solutions by 20%.

Go to the complete objectives list →

Targeted scientific breakthrough of the project: going beyond the current state-of-the-art

DT4GS has set the ambitious target of playing a key role in the realisation of the potential benefits of DTs towards zero-emission shipping

Going beyond current advancements in **ship operational optimisation**

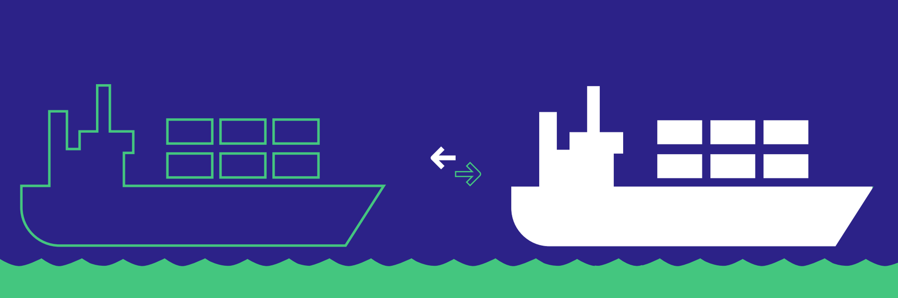
Going beyond current advancements in **ship design & testing**

Going beyond technology implementation to address shipping's reluctance to innovate

Going beyond a uni-sectoral focus

Going beyond piecemeal approaches

Read the complete Targeted scientific breakthrough statement →



Impact

The results of the project will contribute to the acceleration of **green shipping transformation targets** in the short, medium term and long-term as follows:

i1 **20% reduced CO2e in the short term** by use of DT4GS for fleet performance optimisation to be promoted for the widest possibly industry use (by launching both commercially backed and open source-based services) creating a launchpad for accelerated progress towards zero emission shipping

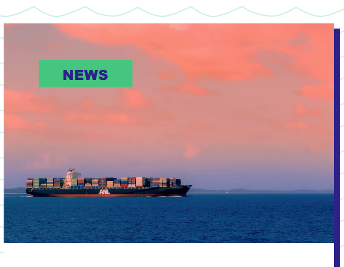
i2 **20% improved cost efficiency for GS solutions** using DT4GS for reducing the cost of physical testing in the short to medium term (support services for equipment manufacturer's, retrofitting designers and yards, and class)

i3 **55% reduced CO2e by 2030** using DT4GS for robust planning and progressive retrofitting of GS technologies whilst capitalising on the benefits from I1 and I2 to introduce incremental automation of ship functions

i4 **Zero-emission waterborne transport by 2050** by use of DT4GS to support new ship design and construction with integrated GS technologies/ systems. Target faster DT adoption by a broader range of ship designers and shipyards including SMEs with opensource options.

Go to the complete impacts description →

News & updates



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Partners

The **DT4GS Consortium** represents a multidisciplinary group composed of **22 participants** from **10 countries** within the European Union.

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Discover the consortium →

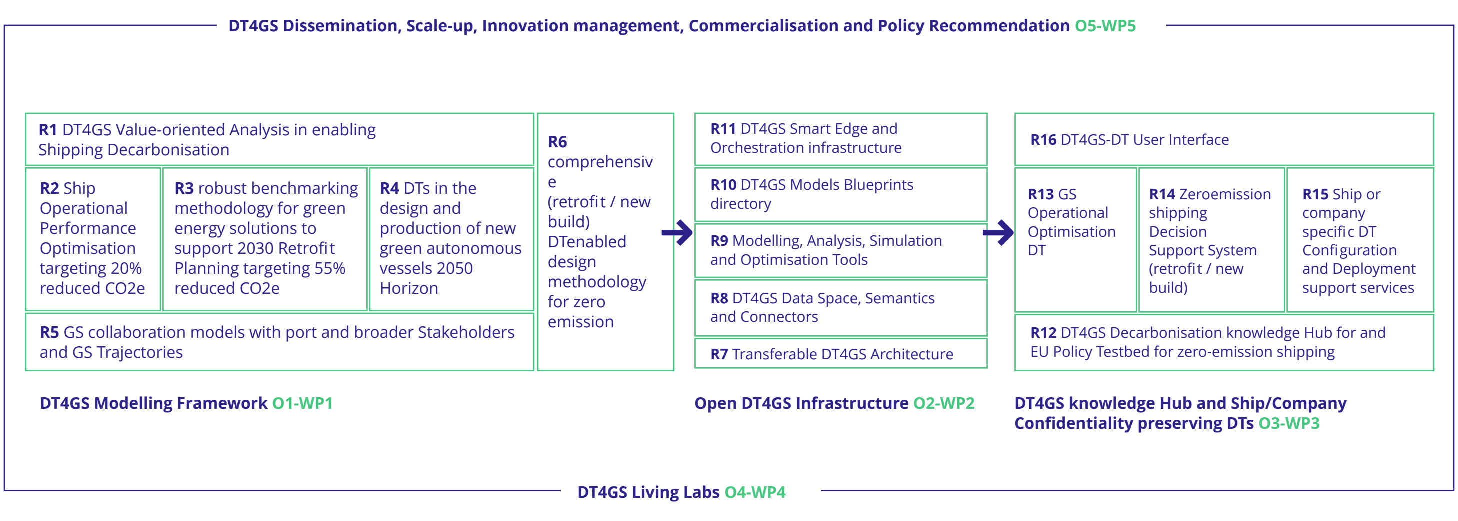
If you want more informations about the DT4GS project, please feel free to contact us at info@dt4gs.eu

This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement no. XXXXXX

The Project

Objectives and Ambition

The project objectives, results, verification means are presented in the following sections



Objective 1. Analyse the application of Digital Twins in enabling decarbonisation of shipping and develop associated modelling frameworks to support practical innovations in ship performance optimisation, ship retrofitting, and Smart Green Ship new builds, in turn guiding investment and financing decisions.

×

R1. Value-oriented analysis guiding the specification of high-level requirements for the project's research and development activities including a) Relevant scenarios and strategic case studies; b) classification/regulatory issues; c) alignment of industry stakeholders with key GHG reduction strategies and solutions; d) key transitioning challenges and enabling factors, and d) policy and standardisation roadmaps.

R2. Analysis, aggregation, and standardisation of data-driven ship performance optimisation models to support supervisory control and optimisation of environmental performance [TRL2-3→5]

R3. Creation of robust benchmarking criteria and methodology to instrument and manage environmental impact and to compare and select optimal green energy solutions [TRL4→5] and associated models, to drive model/solution deployments commensurate with suitability and maturity assessments [TRL4→5-6].

R4. Formal methodology for applying Digital Twins in the design and production of new green autonomous vessels. This includes the aspects of sensing, monitoring/ measurement and control within the ship, as well introducing intelligence into the shipbuilding process [TRL4→5-6].

R5. Model development for the collaboration between ships and port green fuel bunkering services and port DTs for end-to-end supply chain optimisation [TRL4→5-6].

R6. Development of comprehensive (retrofit/new build) DT-enabled design methodologies for zero emission shipping and to manage continuous and sustainable transitions for the project's LLs by integrating the new methods and models proposed in the project, R2-R5, based on relevant concept design work. A focus on the definition of KPIs orienting the design choices and manufacturing processes [TRL3-4→5-6].

KPIs & Means of Verification

Minimum 3 strategic case studies covering zero emissions solution scenarios linked to key requirements for data and models published in project website by M4; Comprehensive library for ship performance optimisation models (10+), endorsed for completeness and fitness for purpose by minimum 6 technical, operations, and sustainability managers; taxonomy of green energy solutions including benchmarking criteria for each category and deployment models published in peer review journals.

Objective 2. To implement and deploy DT4GS's models, DTs, and DT-based services across the waterborne transport sector. The infrastructure will follow an open architecture to assist partners in customizing their own in-house DT4GS services, as well as to enable external stakeholders to use the technology through suitable open-source licenses.

+

Objective 3. Provide DT4GS Knowledge Hub, the DT4GS reference solutions for decarbonisation, and tools to support the deployment of these solutions to ships/fleets using the facilities developed in WP2.

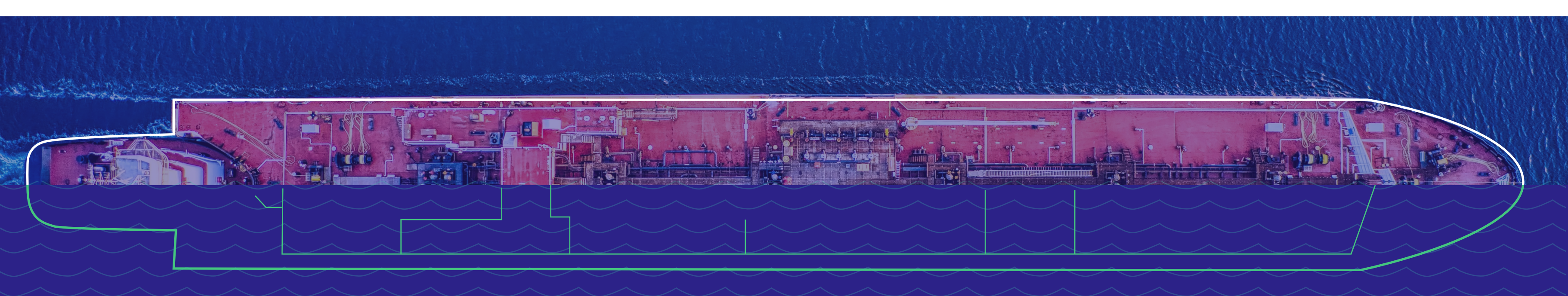
+

Objective 4. Plan and operate four Living Labs led by ship operators, which will represent all shipping segments. The LLs will implement solutions

+

Objective 5. DT4GS Dissemination, Scale-up, Innovation management, Commercialisation and Policy Recommendation.

+



Going beyond

DT4GS has set the ambitious target of playing a key role in the realisation of the potential benefits of DTs towards zero-emission shipping. To achieve this, the project will build on previous results, will capitalise on cooperation opportunities with ongoing projects and initiatives and will go beyond the state of the art in a number of ways, as described below.

Going beyond current advancements in ship operational optimisation

×

The project provides a next-generation solution for total ship operational optimisation based on DT technology capable of automated adaptation according to ship/vessel types and operational profiles, to incentivise investments towards full decarbonisation. This will utilise the DT4GS (Green Shipping) Dataspace16 as part of the Open DT4GS infrastructure for robust data collection, transmission, analysis, simulation and optimisation to enable operational and energy efficiency improvements for decarbonisation and emissions reduction. Furthermore, it will support condition-based ship surveys and operations which are remote and more automated. Our planned use of fog/edge computing technology will provide latency and security benefits and added levels of intelligence, orchestration and autonomy in ships. More specifically, advancements, largely building on assets available through the project's partners include:

(1) DT auto-adapting capabilities for ship/vessel class and associated vessel operational profiles;

(2) robotic data acquisition with 3D reconstruction;

(3) a novel automated and distributed Trust and Identity Management Framework enforcing the NIS directive, GDPR and Cybersecurity acts;

(4) automated and instrumented analysis-ready ship data generated by events or dynamically at query time;

(5) development of DT blueprints for ship operational performance optimisation and creation of quantum analogues for AI/ML and optimisation models, targeting increased accuracy, standardisation, and reusability;

(6) intelligent monitoring and control connectors (IMCCs);

(7) the DT4GS (Green Shipping) Dataspace wirh innovation across data value , interoperability, trust and governance and new IMCCs particularly to support automated configuration of DT Edge components in ships using quantum models;

(8) control points business logic for automated configuration and updating of ship models;

(9) integration of advanced 5G capabilities.

Going beyond current advancements in ship design & testing

+

Going beyond technology implementation to address shipping's reluctance to innovate

+

Going beyond a uni-sectoral focus

+

Going beyond piecemeal approaches

+

Impact

Product lifecycle management (PLM) solutions offer a holistic approach to shipbuilding and a single source of service knowledge that increases accuracy and coordination across the global service network, enabling fleet upgrades, improvements, and modifications that are crucial to overall fleet performance. Such benefits have established a digital shipyard market expected to reach USD 3,967 million by 2030, from an estimated USD 693 million in 202029.

Hyundai Heavy Industries, one of the world's largest shipbuilding companies, installed the first PLM infrastructure that has delivered enhanced productivity and high design quality incentivising similar applications in many EU sites.
Artificial Intelligence (AI) is increasingly used to increase automation of design, and production and deliver increased automation in ships. Pairing technologies include IoT, blockchain, big data, robotic process automation with AI and ML Big data analytics helps to uncover hidden patterns, in market trends, and in real-time risk assessments.

Importantly, **DTs provide the ability to instantaneously analyse, compare, and integrate data such as ship IoT monitoring**, port state control inspections, events history terminal feedback to identify anomalies and trends.

Even though DT Product lifecycle management offers a way to long-term decarbonisation in shipping, the medium-term impact is likely to be small, as world fleet renewal is at slow process. For the next 20 years, the efforts of decarbonisation will primarily require investments from ship owners/operators in CO2e reducing solutions. Consequently, the target impact for DT4GS is to enable shipping companies capitalise on the DT potential to increase ship efficiencies to constantly reduce CO2e in the short-term, and to support robust investment decisions and planning [retrofit/newbuilds] longer term.

For this the project will increase investor confidence in decarbonisation solutions by providing:

1
A next-generation user led solution for total ship operational optimisation based on DT technology capable of adaptation according to ship type and increasing ship automation, thus delivering superior cost effectiveness to ship operators

2
A Virtual Testbed and Decision Support System, creating a collective capability of the waterborne industry to harmonise efforts and increase synergies between DT applications in shipping companies, shipyards, equipment manufacturers, class societies, ports, and policy makers.

3
The DT4GS Decarbonisation knowledge Hub which will provide a trusted observatory of key decarbonisation solutions, supporting and using above.

The consortium comprises a **unique blend of shipping stakeholders and SOTA** providers to achieve above. Importantly, the consortium has a reach to over 15% of the global fleet which is the target group for the adoption of the DT4GS solutions (e.g., DANAOS maritime software operates on-board 5000 ships of all types). Our Advisory Board includes the Digital Container Shipping Association (DCSA), and thevDT4GS Cluster target over 100 members during the project.

Project's Pathways Towards Impact

The results of the project will contribute to the acceleration of green shipping transformation targets in the short, medium term and long-term as follows:

i1
20% reduced CO2e in the short term by use of DT4GS for fleet performance optimisation to be promoted for the widest possibly industry use (by launching both commercially backed and open source-based services) creating a launchpad for accelerated progress towards zero emission shipping

i2
20% improved cost efficiency for GS solutions using DT4GS for reducing the cost of physical testing in the short to medium term (support services for equipment manufacturer's, retrofitting designers and yards, and class)

i3
55% reduced CO2e by 2030 using DT4GS for robust planning and progressive retrofitting of GS technologies whilst capitalising on the benefits from I1 and I2 to introduce incremental automation of ship functions

i4
Zero-emission waterborne transport by 2050 by use of DT4GS to support new ship design and construction with integrated GS technologies/ systems. Target faster DT adoption by a broader range of ship designers and shipyards including SMEs with opensource options.

The Project's Pathways Towards Impact

Impact EU level
20% reduced CO2 short term by use of DT4GS for fleet performance optimisation → Industry use of DT4GS for robust Planning of GS technologies for 55% reduced CO2by 2030 and zero-emissions new-build ships in a 2050 horizon → 20 %improved cost efficiency for GS solutions using DT4GS for reduced cost of physical testingConsolidate

Increased investors' confidence

Outcomes expected effects, over the medium term
Adoption of DT4GS for ship/ fleet performance optimisation by 20+ shipping companies → Use of DT4GS zero-emission shipping Test bed and Decision Support System (retrofit / new build) by growing Cluster shipping companies shipyards and GS solution providers → Use of DT4GS services to reduce the cost of physical testing by GS solution producers, designers and class

Vessel types	Ship systems	Ship decarbonisation Solutions	Operational environments	Operational links	Intervention stage
Container, Tanker, RoRo, Bulk	Engine & machinery, Hull / propeller, Electric network (HVAC, cargo handling)	Wind power, Energy storage, Green fuels, Green energy	Maritime, IWW	Port DTs, green energy systems	Newbuilds, Retrofits

Open DT4GS Framework infrastructure
federation-based analytics and Integrated data and services

Consolidate and Develop DT models to enable green ship transformation targets promoting standardisation and extending interlinking with modelling initiatives →	Develop open DT4GS Infrastructure promoting standardisation of DT4GS Dataspace AI Knowledge Packs and Edge Autonomy →	Develop new Green Shipping Support services - design of Green Smart Shipping - operation of Green Smart Shipping
Efficiency and CO2 reduction optimisation driven modeling framework -process equipment geometry	New Shipping Decarbonisation Data Space and Smart Data access Semantics and – Intelligent monitoring and control connectors IMCCs	Decarbonisation Data/Intelligence Hubfederatedwith similar industry data
		Smart green new-build reference design experimentation and construction support
Modelling the Performance Dependability and Cost efficiency of Ship Decarbonisation Solutions	DT blueprints for ship performance optimization, creation of quantum analogues for AI/ML models	EU Policy Testbed for zero-emission shipping
Modelling digital transformation procedures and organizational processes	Automated Analysis-Ready Ship Data -Automated configuration of ship models -Edge Autonomy	GS solutions' pre productions service acceptance

Expected impact towards topic outcomes

The DT4GS value proposition is a user-oriented, trusted Open Digital Twin Framework that is used to deliver the following outcomes:

1.1.1.1.

Adoption of DT4GS for ship/fleet performance optimisation by 20+ shipping companies

The plan is that 4 shipping company partners will deploy and use a bespoke DT by month 14 of the project, to establish evidence-based solutions that will stimulate additional deployments from the Cluster, targeting 6+ adopters by the end of the project. The subsequent 10 adopters within 2 years from project end will be existing customers of consortium partners.

1.1.1.2.

Use of DT4GS zero-emission shipping Virtual Testbed and Decision Support System (retrofit / new build) by growing Cluster of shipping companies. shipyards and GS solution providers

The DT4GS zero-emission shipping Virtual Testbed and Decision Support System will support different groups of stakeholders as follows:
• Shipping companies and their consultants plan decarbonisation strategies
• Shipyards to create a PLM solution for zero emission ships
• Decarbonisation solution providers, particularly on emerging carbon capture solutions and fuel/ hydrogen cells, to provide standard 'connectors' that will enable them to assess the performance of their products for specific types of ships and provide data updates enabling integration of their products in shipping company or shipyard solutions
• Classification societies to assess safety and regulatory implication and develop/provide e-compliance services
• EU and national government policy makers to monitor progress and assess potential policy instruments
A compendium of key use cases from the above will be published by month 24 to promote its use and to facilitate federation with similar platforms and related projects.

1.1.1.3.

Use of DT4GS services to reduce the cost of physical testing of GS solutions

Support services for equipment manufacturer's, retrofitting designers and yards, and class enabling a reduction of the average cost of retrofitting in the range of 20%. This will be part of phase 2 investigation in the LLs, but it is acknowledged that realisation of this target implies concerted industry efforts. Also, there are open questions regarding the actual cost model for retrofitting and particularly the proportion of costs associated with physical testing. In each LL the projected costs for intervention of interest will be established and impact of DT support services will be established. A working group will be set up to create a knowledge network to monitor use cases and promote best practices on this topic.

DT4GS will support shipping companies in deriving zero shipping transition plans for their fleets with increased confidence in technoeconomic predictions and access to DT4GS zero-emission shipping Virtual Testbed and Decision Support System.

The shipping company partners will spearhead this activity, imparting their experience having already embarked in establishing decarbonisation plans. The DT4GS decarbonisation strategy will advance the interests of each stakeholder group, through quantifiable outputs from the LL's plus will provide a "least-risk, best-reward" roadmap that best aligns to the macro-level business imperatives for each stakeholder group. A comprehensive capacity building, dissemination and communication strategy will ensure that DT4GS outputs are adopted and embedded across all shipping stakeholders.

Success in DT4GS will contribute to achieving European leadership in green technologies. The project guarantees a close interaction between research institutions, industry and high-profile SMEs. All partners, particularly SMEs and scientific staff, will gain novel technological know-how, establishing them as lead future actors in combining digital and greening sustainable technologies. In order to stimulate the involvement of women in this sector, DT4GS will follow the principles of the EU Charter and Code for Researchers in its development activities.

Living Labs

The overarching goal is to maximise sustainable adoption of the DT4GS innovations and energy efficient behaviours across the fleets of the fur participating Shipping Companies (SC). DT4GS is designed as a SC-centred innovation ecosystem, for the systematic exploration, experimentation and evaluation of innovative ideas, scenarios, concepts and related technological artefacts in real life use cases involving CSs as co-creators of emerging ideas, and a real-world shipping DT deployment at sufficient scale to demonstrate implementation. This way convincing exemplars of actual DTs working and producing measurable benefits will be established early in the project and will be used to engage a growing number of users across all industry to incentivise use beyond the project lifetime.

LL1

Company
Euronav NV

Fleet
74 vessels (mix of VLCCs, Suezmaxes, ULCCs and FSOs)

Status of decarbonisation planning
Euronav has reached a reduction of 33% in Co2 emissions per ship between years 2017 – 2020. Moreover, as a Poseidon Principles signatory, Euronav is committed to (and achieved) at least 2% better performance vs. PP trajectory which foresees a consistent reduction of carbon emissions in a YoY basis

Use of vessel/fleet monitoring systems
Propulsion Analytics QUAD™, CMB FPM ™, Propulsion Analytics Hyper Cube ™, Euronav FAST ™ platform.

Vessel to participate in project
Name: ARDECHE
Type: Crude Oil Carrier
Operational environment(s) Global

PORT OF REGISTRY: ANTWERPEN FLAG: BELGIUM OWNERS: EURONAV N.V TECHNICAL MANAGERS: EURONAV SHIPMANAGEMENT (HELLAS) LTD. CLASSIFICATION: DNV-GL= BUILDERS / HULL No HHI / HN S791 BUILT: 12th January 2017 MAIN ENGINE: HYUNDAI – MAN B&W 7G80ME-C9.2

Energy demand	163 GWh/yr
Projected savings via DT	**>15%**

LL2

Company
Danaos Shipping Co

Fleet
65/71 Container Vessels ranging from 2,200 TEU to 13,100 TEU

Status of decarbonisation planning
Danaos meets IMO 2030 carbon intensity targets 11 years ahead, by achieving 41.5 % reduction in CO2e emissions per ton-miles for year 2019 compared with 2008

Use of vessel/fleet monitoring systems
LAROS (Prisma), CASSANDRA (DeepSea), WAVES (Danaos Management Consultants)

Vessel to participate in project
Name: Zim Luanda
Type: Container
Main particulars: https://www.danaos.com/fleet/fleet-details/default.aspx

Panamax 4250 TEUs | 50.550 DWT | built 2009

Energy demand	48 MW/year
Projected savings via DT	**>20%**

LL3

Company
Baleària

Fleet
30 ROPAX vessels

Status of decarbonisation planning
50% CO2e reduction by 2030 (DT4GS goal for retrofitting solutions)

Use of vessel/fleet monitoring systems
Sensors and equipment for real time monitoring operation, energy consumption and emissions generated by 5 vessels - Green C Ports CEF EU co-funded project

Vessel to participate in project
Name: Marie Curie
Type: ROPAX
Operational environment(s) Short-sea shipping

Main particulars: 9498767 MARIE CURIE is a ROPAX with the following features: 7000 DWT, 25 knots, capacity for 880 passengers and 608 vehicles, 186.6 m LOA and 26 m BOC, built in 2011.

Energy demand	155 GWh/yr
Projected savings via DT	**>20%**

LL4

Company
Star Bulk Shipmanagement Company (Cyprus) Limited

Fleet
128 Bulk Carriers Ranging From 52,000 to 210,000 DWT

Status of decarbonisation planning
Working with various stakeholders in many projects to explore the best solutions fit to our vessels and operation profile.

Use of vessel/fleet monitoring systems
Data acquisition hardware that feeds our own developed VPM software.

Vessel to participate in project
Name: Maharaj
Type: Bulk Carrier
Operational environment(s): Worldwide

Main Particulars: https://www.starbulk.com/gr/en/fleet-details/

Newcastlemax Bulk Carrier, Year Built: 2015 DWT: 209,472.00 mt, MCR: 15,250kW@66 RPM

Energy demand	Average power ≈50% MCR daily basis 365 days
Projected savings via DT	**As much as possible but >15%**

If you want more informations about the DT4GS project, please feel free to contact us at **info@dt4gs.eu**

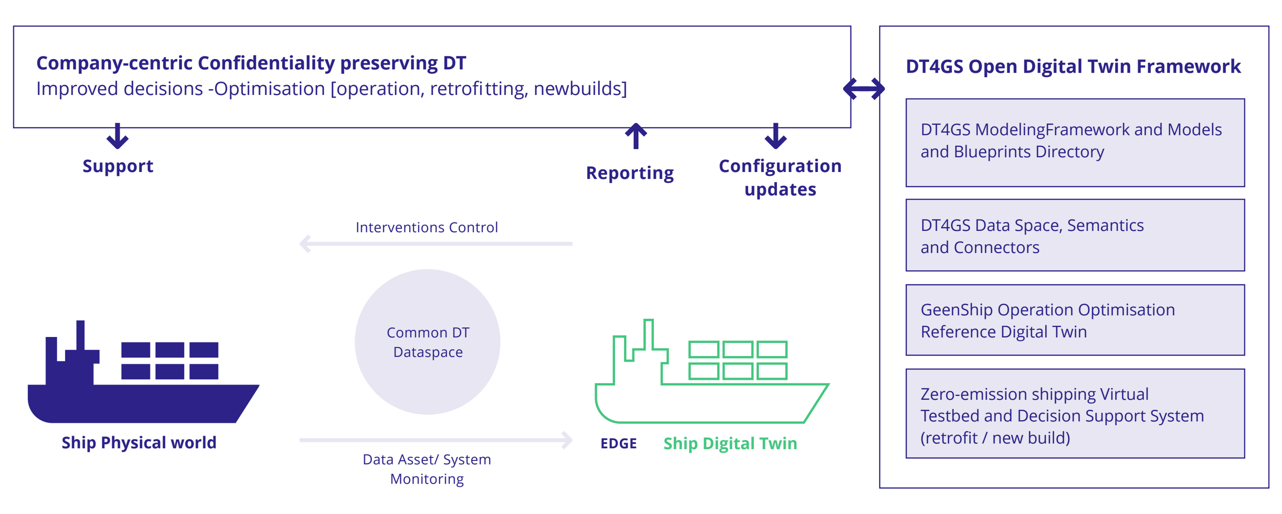
This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement no. XXXXXX

Methodology

Overall research approach

As digitalisation in the shipping industry has been maturing over the recent years, DT adoption will be dependent on establishing trusted and convincing DT application exemplars and ensuring that ship operators and other industry stakeholders can set up their own DTs based on their own business models, building their own confidential knowledge at reasonable cost.

Sensing and Response Loop through DTs



DT4GS will provide a **virtual representation of ships and physical transport entities** with a bi-directional communication links from sensing to actuation/control and data driven simulation and AI based decision support to people who will implement necessary actions. In DT4GS extra emphasis will be given to:

• DT applications **onboard the ship utilising advanced IoT** and edge computing infrastructure

• Using **labelled data for AI/ML training** and to provide the ground truth for accurate predictions (supervised learning), and where there is need to learn from experience to provide the reward function (reinforcement learning)

• Creating a **common point of reference in the digital world for shipping vessels**, which different stakeholders can access and utilise and adapt in line with their own internal business needs.

DTs in DT4GS will evolve along with their physical counterparts, mirroring vessel lifecycles

DT4GS will further capitalise on the close data-driven relationship between the physical and virtual entities to provide DTs that learn from experience through suitable ML/AI models, closing the loop for improving the capabilities of the system in an automated or semi-automated way.
To that end, **DTs in DT4GS will evolve along with their physical counterparts, mirroring vessel lifecycles**. This process will enable the DT to not only reflect the initial physical state of vessels (e.g., at time t=0) and predict future states (t>0), but also to **learn from the observed evolution of the physical state** and its deviation from associated predictions (e.g., at t=1), thus improving upon immediate and future predictions (t>1) and reinforcing general forecasting capability in DT4GS models.

In comparison to digital shadows with learning capability, DTs are different in that **our real-time analytics are used to trigger timely actuation on physical objects**. This will enable the sensing-analysis-action cycle to become completely automated (i.e., without supervision) according to required criteria, for all aspects of vessel operations. **DTs will work with conventional communication** and computational systems, but enhancements would be expected when ships have access to higher performance computers and higher-bandwidth, low-latency communications like 5G.

To help reduce computational resource usage and increase accuracy DT4GS will investigate Quantum-inspired analogues of ML/AI optimisation algorithms in key application areas.

The DT4GS's multidisciplinary approach

DT4GS applies **Multidisciplinary to draw on knowledge from different disciplines** including ship and transport business and economics as well as ICT and Engineering.

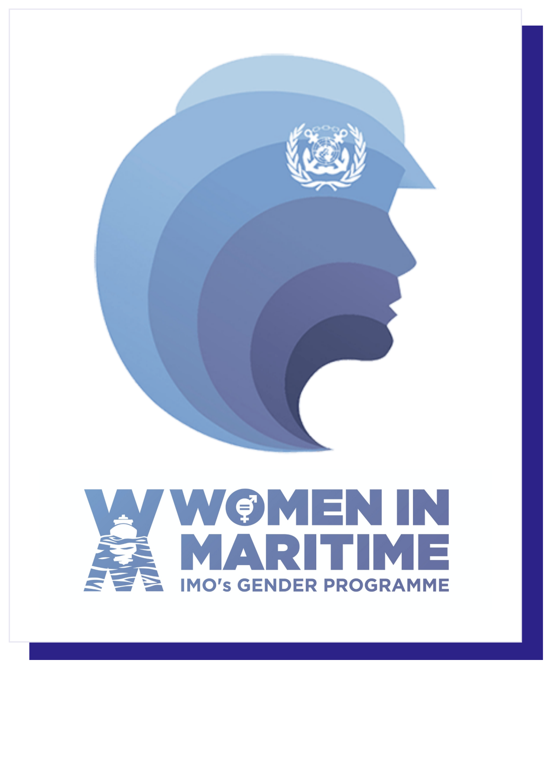
Interdisciplinarity will be applied to analyze, synthesize and harmonizes links between disciplines to produce new expertise and methods associated with project results that are expected to break new ground, The most prominent of such results are Data-driven Green Ship 2050 reference designs / models per ship type, taking into account size and other parameters to be determined during the LLs and, exploiting synergies between emerging ship and energy innovations, and new production methods.

Gender Dimension

DT4GS is aware that **there is still a pronounced under-representation of women in European Research**, particularly in the branches of traditional 'hard' sciences and in Research leadership positions.

Indeed, gender inequality is also an important issue in the traditionally male dominated maritime sector, where recent statistics show that only 1.2% percent of the global seafarer workforce are female24. The IMO choose **"Empowering Women in the Maritime Community"** as the World Maritime Day theme for 2019. In raising awareness of the importance of gender equality, and to highlight the important contribution of women to the maritime sector and in 2019, the IMO Assembly adopted a resolution urging further firm action in coming years to advance gender equality.

Gender equality in research is essential not only for fairness, but to address current and future deficits in skilled labour within the EU. **DT4GS** is aware of this inequality and **will make efforts within the project to ensure gender-based aspects** considered as an important dimension across all aspects of its scope and design. DT4GS will also strive to ensure that gender equality is thoroughly considered in the policy to practice principles to 'design out' opportunities for discrimination and to ensure equal representation, eliminating all forms of bias.



Training sessions and LLs will introduce gender issues feedback systems were gender-based responses will be analysed to identify specific actions.
DT4GS will use methodological and practical tools to align its operation and approach to an **overall gender-balanced approach to innovation** and will focus its efforts in improving the in-balance on security/ engineering distribution as professions promoting thus diversity and opportunities' equity. The project will also support the Horizon Europe objectives to promote equal gender balance by ensuring similar chances to male and female team members participation to project activities and meetings.

In addition, DT4G foresees that increased uptake of DTs in the maritime sector will support remote operation, and faster re-training, and re-familiarisation of seafarers with vessels and their operational systems. In turn supporting flexible working and women re-entering the workforce following periods of absence.

The DT4GS project will

• Encourage all beneficiaries to implement long-term institutional change by adopting Gender Equality Plans thus, increasing the participation of women.

• Encourage all partners to consider gender dimensions within their tasks.

• Encourage representation of women at meetings and in the project tasks and management teams

• Consider gender issues within all management and recruitment processes to boost the involvement of women.

Specifically, the **DT4GS consortium acknowledges the European Commission Gender Equality Strategy for 2020-2025**, which sets out the Commission's broader commitment to equality across all EU policies Implement a Gender Equality Plan (GEP); Integrate the gender dimension into research and innovation; Increase gender balance throughout the programme with a target of 50% women in Horizon Europe related boards, expert groups, evaluation committees and among research teams
Therefore, the DT4GS project will
• Encourage all beneficiaries to implement long-term institutional change by adopting Gender Equality Plans thus, increasing the participation of women.
• Encourage all partners to consider gender dimensions within their tasks.
• Encourage representation of women at meetings and in the project tasks and management teams
• Consider gender issues within all management and recruitment processes to boost the involvement of women.

Open science approach

Over the past years, open science principles and initiatives have gained popularity, increasing the amount of scientific and scholarly content that is openly available, thereby facilitating collaborations and interdisciplinary research, increasing the reproducibility and reuse of research results, and accelerating scientific discovery.

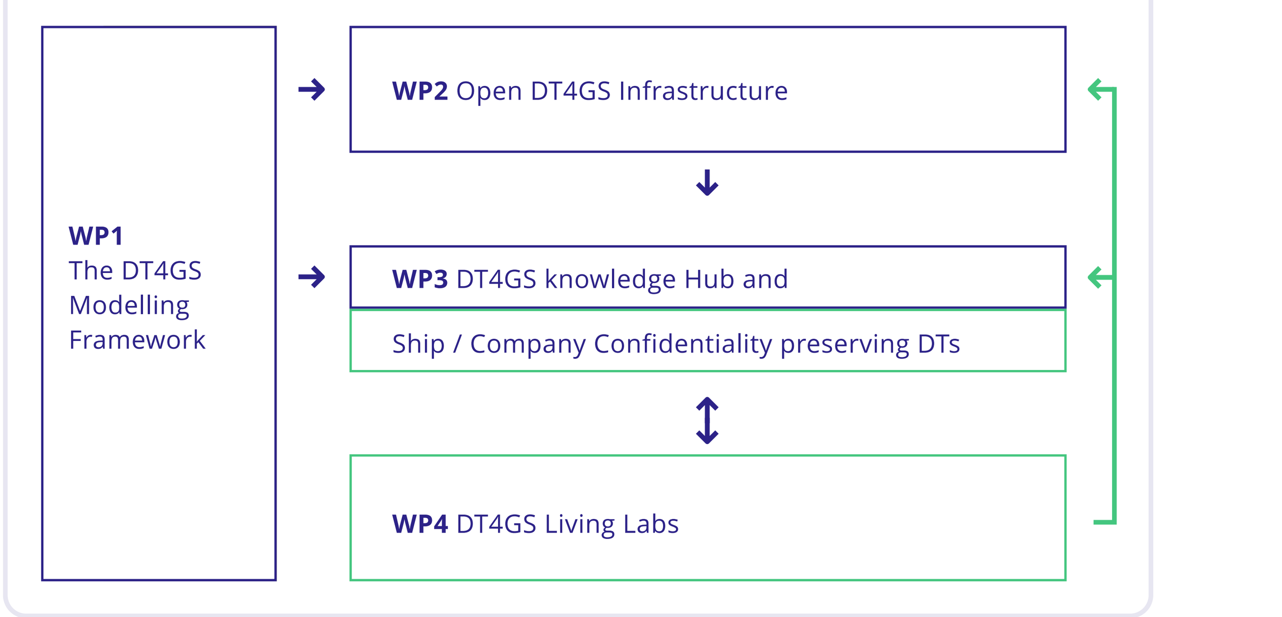
OpenAIRE provides an Open Research Graph linking more than 450 million research metadata records. The **European Open Science Cloud** (EOSC) offers to European researchers, innovators, companies and citizens a federated environment where they can publish, find and re-use scientific data, tools and services. In line with these efforts and initiatives, **DT4GS will apply an open science approach following the FAIR principles** for data and services, aligning to the European Commission guidelines on ensuring that data created through research activities is Findable, Accessible, Interoperable and Reused.

Project outputs and their metadata resulting from the LLs, including data assets, scientific publications, research methodologies and protocols, services, and workflows, will be documented and managed according to these principles. The coordinator has a long and positive history respecting open science principles (e.g. in projects coordinated such as SELIS, ICONET, CHARIOT) and will continue to implement these best practices in DT4GS. **DT4GS will publish no confidential nor restricted results under Open Access**, regarding all scientific publications produced during the project. Moreover, DT4GS will **promote Open Innovation through the establishment of a DT4GS Cluster** that will help to upscale and replicate the results by EU shipping companies and waterborne transport industry actors. The Advisory Board (AB) will also help to upscale and replicate the results at international level.

These bodies will facilitate knowledge transfer among multidisciplinary groups of stakeholders, academia, researchers, authorities and other industry clusters and Innovation Hubs to ensure that the project outputs are embraced by other projects and research initiatives and connect with important policy bodies in multiple domains.

Work Packages

All technology developments, modeling frameworks and models are implemented in WP1, WP2 and WP3, interacting with the LLs in WP4 both in the conceptualization of the approach (issued as framework, models, infrastructure deployments and components v1.0 tested in the LLs), while a second version (complete deployment) takes place after M18.



If you want more informations about the DT4GS project, please feel free to contact us at **info@dt4gs.eu**

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Clustering

TBD

D5.2: DT4GS Cluster [A=M18; B=M36].

A) 1st DT4GS Clustering Report;

B) 2nd DT4GS Clustering Report

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Partners

The Consortium

The **DT4GS Consortium** represents a multidisciplinary group composed of **22 participants** from **10 countries** within the European Union.

The consortium brings together the following groups of stakeholders:

1. Waterborne Transport prominent industry leaders and associations that can both inspire and incentivise the project's vision towards the creation of a European open Dataspace and Digital Twin infrastructure for Green Smart Shipping and to accelerate the transition path for a Green Europe. Shipping companies: EURONAV, DANAOS, Baleària and STARBULK representing the Tanker, Container, ROPAX and Bulk types of ships and collectively managing a fleet of over 250 vessels.
Port of Valencia through FV with established Port DT and leading green port capabilities, RINA both as classification Society and leading Consulting on both shipping decarbonisation and digitisation, CEA deliver Electricity and Hydrogen for the Transportation Division providing prominent and extensive expertise in Green Energy, SEASTEMA, within the FINCANTIERI Group, specialise in integrated automation systems and onboard energy optimisation. Remontowa Marine Design & Consulting (Poland): is a member of the REMONTOWA shipyards and ship repair yards and IWT the European Inland Waterway Transport Platform

2. Shipping Digital Twin solution providers bringing world class technologies and leading-edge research and strategy expertise on digitalisation for zero emission shipping. This group comprises of major technology providers IBM, software SME innovators focusing on specialist and open-source software and AI components (KNT, AXON, VLTN. GLAFKOS and SEAPort) and leading maritime software solutions providers DANAOS management and SEASTEMA.

3. DT4GS Universities and research Centres that will support the above two groups to achieve the project's objectives. This group includes maritime Universities TUD and WEGEMET, the ICT research centre ATHENA and Environmental Research Centre CNR.

Across each group the individual partners not only represent a force for change towards a sustainable world, but also inspiration to create knowledge synergies that serve the different innovation dimensions tacked by the project.

The consortium coordinator INLECOM Group, Belgium, was established in 1996 with the seminal charter of promoting innovative Information and Communication Solutions in shipping and the Group has since expanded upon these foundational competencies. Today, INLECOM are an **established leader in Digital Ecosystem Platforms & Technologies** in domains such as ICT, Security and Sustainability, IoT, Cognitive Computing, Social Software, Cloud, Analytics, Big Data, Mobile Computing and Transport & Logistics, Smart Cities, and Energy. With an international team of experts in the areas of Mobility, Business Consulting, Commercialisation, EU PO and USPTO Patent Filings with hundreds of successfully granted/issues patents, Solutions and Business Analytics, the team provides strategic knowledge-centric solutions and consultancy.

Waterborne Transport prominent industry leaders and associations

EURONAV

CORE COMPETENCIES

Euronav with a fleet of 74 vessels is the world's largest independent crude tanker operator with a vision to lead responsibly the global crude oil tanker industry. With concrete examples showcasing a path towards shipping decarbonization: GHG emissions tracking, co-founder and ambassador of Poseidon Principles, member of 'Getting to Zero' Coalition and Sea Cargo Charter and having scored B grade in the Carbon Disclosure Project submission R&I, testing carbon capture and storage solutions (MemCCsea project); collaboration with shipyards and oil majors to support design of zero emission fuels; (JDP initiative); Plug and Play Maritime innovation platform.

PROJECT ROLE

EURONAV will both contribute and use DT4GS in Voyage optimization; Energy efficiency planning for vessels; Fleet rejuvenation strategy and Ship design and construction and R&D decarbonisation accelerator. Will lead LL1 leveraging an in-house DTs for vessel energy-efficiency. Lead T1.1 DT4GS Value-oriented Analysis in enabling Shipping Decarbonisation and participate in research for developing innovative DT components in tasks T1.2,1.3, T2.1,2.4, T3.2,3.3, T4.1, 4.2 and will promote uptake and impact in T5.1,5.4.

danaos SHIPPING CO LTD

CORE COMPETENCIES

DANAOS shipping is one of the largest independent owners of modern, large-size containerships with distinct edge in advanced shipping technology and long track record of safety, efficiency, and environmental responsibility. DANAOS has implemented a robust Environmental Management System integrating environmental issues with company operations and actively participates in research, testing and developing new technologies which are important assets for DT4GS

PROJECT ROLE

DANAOS shipping is a key partner active in all WPs and will lead LL2 spearheading the early implementation of the GS Operational Optimisation DT leveraging existing digital management systems. DANAOS will lead LL2 and also technical developments and the commercialisation of the GS Operational Optimisation DT through DANAOS Management, WP3 Leader and task leader T2.4, 3.2, 3.3.

BALEARIA

CORE COMPETENCIES

Spanish shipping company specialized in passenger and rolling cargo transport among the Balearic Islands with a fleet of 32 ships. Baleària has evaluated which LNG technology would give the best outcomes to comply with technical and environmental regulations and retrofitted five vessels. Smart solutions for the retrofitted vessels in order to increase safety, operational efficiency and energy efficiency, Expertise in LNG bunkering, Models and emission measurements JIT arrivals which will be extended to a DT solution with SEAPort Solutions

PROJECT ROLE

Will lead the evidence-based performance of LNG solutions and planning Bio-LNG H2, NH3, methanol and synthetic fuels as pathways for the decarbonisation Extend Sensors and equipment to monitor in real time the operation, energy consumption and emissions generated by 5 vessels - Green C Ports CEF project to full DT. Lead LL3 and participate Modelling Framework (WP1) Open DT4GS Infrastructure (WP2) and will promote uptake and impact in WP5.

STAR BULK

CORE COMPETENCIES

Star Bulk fleet will comprise of 128 modern bulk carriers built in world-class shipyards and with an average age of approximately 9.3 years one top performer in the Rightship risk rating globally. Star Bulk is a signatory of the United Nations Global Compact supports the Global Maritime Forum as a partner and is a member of the Getting to Zero Coalition alliance.

PROJECT ROLE

Star Bulk lead LL4 and the overall DT4GS developments for bulk carriers leveraging its data acquisition hardware that feeds in house developed VPM software. Strong interest to explore hull DTs and cargo optimisation supported by e-robotics and will also deliver industry perspective in DT4GS Modelling Framework (WP1) and DT4GS Data Space, (T2.2)

FUNDACIÓN VALENCIAPORT

CORE COMPETENCIES

Represented by the Fundación Valencia Port brings expertise in all aspects of greening ports and specifically green fuels and Hydrogen solutions leading projects such as H2PORTS. FV also brings expertise in port centric digitalisation for transport chains and has developed experimental DTs for terminal operators

PROJECT ROLE

VF leads the integration of shipping DTs with port DTS and Applications for planning port supply of green fuels. Further FV will oversee development for JIN arrival DTs which will support in LL3. FV will lead LLs WP4 the development off the DT4GS Cluster (T5.2)

RINA

CORE COMPETENCIES

RINA is a global corporation that provides services across the Energy, Marine, Certification, Transport & Infrastructure and Industry sectors through a global network of 200 offices in 70 countries. RINA's Energy and Transport & Infrastructure business, which helps support the sustainable growth of operators.

PROJECT ROLE

RINA is leading DT4GS Dissemination, Scale-up, Innovation management, Commercialisation and Policy Recommendation (WP5) and will play a leading role in the development and \promotion of the DT4GS Dataspace and Zero-emission shipping Decision Support System.

cea

CORE COMPETENCIES

The French Alternative Energies and Atomic Energy Commission (CEA) has been involved in renewable energies for 30 years and is now focusing on solar energy, batteries, hydrogen, and also 2nd and 3rd generation biofuels.

PROJECT ROLE

CEA will contribute to Modelling Framework, leading T1.3 and in services for designing the ship energy systems (T3.4 & T3.5), integration of models and simulation/optimisation tools.

SEASTEMA

CORE COMPETENCIES

SEASTEMA within the Fincantieri Group, specialises on integrated automation systems. The core product Ship Management System (SMS) provides monitoring and control functions for the main ship plants (IPMS, Integrated Platform Management System: Propulsion, Power, Auxiliary and Safety) and also Integrated Bridge System (IBS) and Decision Support Systems (Energy Management, Condition Management, Damage Management, Fleet Management). SEASTEMA relies on dynamic simulation models for design and to offer simulation-based training to IPMS operators

PROJECT ROLE

SEASTEMA leads the modelling FW for ship performance optimisation and the development of the Zero-emission Decision Support System (retrofit / new build). They will be active in the Green Shipping Dataspace, expanding their work in EUROYARDS FW and R&D for creating Internal Intelligent Monitoring and Control Connectors to investigate actuation possibilities in deploying DTs. DT4GS will be exploited by Fincantieri by virtually integrating DTs into ship systems provided by external suppliers.

REMONTOWA SHIPREPAIR YARD

CORE COMPETENCIES

Remontowa shipyard specialize in repairs and modernizations of merchant and naval vessels, ship conversions and repairs. They undertake vessel 'Greening' to deliver fuel consumption savings, converting to methanol fuels and hull replacements.

PROJECT ROLE

Remontowa will contribute to the development of the DT4GS Modelling Framework, Open DT4GS Infrastructure and DT4GS knowledge Hub from a shipyard perspective and also take part in the extended industry LL (LL5).

European IWT Platform

CORE COMPETENCIES

IWT represents the interest of IWT in Europe and aims at a stronger positioning of Inland Navigation in European and National Transport Policies by an intensified contribution to various governing bodies, working parties and standard setting committees.

PROJECT ROLE

IWT will deliver an additional industry perspective for the DT4GS modelling framework (WP1) and will participate in LL5 Extended industry LL (T4.6) as well as promoting the project results in the IWT community.

Shipping Digital Twin Solution Providers

IBM

CORE COMPETENCIES

IBM Research Europe in Ireland delivers breakthrough client focused outcomes in domains such as IoT/Digital Twin, AI Security, Privacy, and Cloud. IBM defines and tests new technologies on real business problems, discovering new growth opportunities. IBM Edge Application, IBM Digital Twin

PROJECT ROLE

IBM are leading the DT4GS Edge and Orchestration Infrastructure (T2.5) and will support the development of the Open DT4GS Infrastructure. IBM will also be a key exploitation partner in the DT4GS impact and scale-up activities.

Konnecta systems

CORE COMPETENCIES

Konnecta's core technologies are currently underpinned by a broad portfolio of eight patent-pending ICT technologies across a broad range of industry verticals, including Information and Telecommunication, Transport and Logistics, Financial, Smart Cities and Smart Manufacturing. Core competencies: connectivity infrastructure – IWT, ontologies, analytics and AI and increasingly involved in Dataspaces and DTs

PROJECT ROLE

KNT are responsible for delivering the Modelling, Analysis, Simulation, and Optimisation Tools (T2.3) and the DT4GS-DT User Interface (T3.5) and will be heavily involved in the delivery of all tasks related to the development of the Open DT4GS Infrastructure and the DT4GS knowledge Hub and Ship/Company Confidentiality preserving DTs

axon logic

CORE COMPETENCIES

AXON LOGIC is an IT company, specialising in applied mathematics, quantum physics, communications in a number of sectors including optimal transport.

PROJECT ROLE

AXON will provide Quantum equivalent models in key areas requiring increased accuracy such as IMCCs – T2.4, T2.5

vltn

CORE COMPETENCIES

VLTN is a Green Supply Chain and Transport Innovation and Consultancy SME, dedicated to data-driven consulting, optimisation and research & development, having a vision for 'Net-zero GHG emissions supply chains that evolve faster than change, delivering balanced value to both business and societal actors.

PROJECT ROLE

VLTN are a key partner in the delivery of the Open DT4GS Infrastructure (T2.1-T2.4) and will contribute to the development of the DT4GS Modelling Framework (T1.2,1.5,1.6). VLTN will also be supporting LL1 EURONAV Tanker-centric DT.

GLAFCOS MARINE

CORE COMPETENCIES

Glafcos is a technical group, composed of Naval Architects, Marine, Mechanical and Electrical Engineers and Programmers, which provides multi-disciplinary advisory services, software products and systems in the maritime and civil industries Specialises in e-robotics for ship inspection and enabling the 3D reconstruction of the hull and related DT applications

PROJECT ROLE

Glafos will contribute to the DT4GS knowledge Hub and Ship/Company Confidentiality preserving DTs, specifically the GS Operational Optimisation DT and DT4GS-DT User Interface (T3.2, 3.5) They will also support the development of the DT4GS modelling FW (T1.2)

SEAPort Solutions

CORE COMPETENCIES

SEAPort Solutions SL is a start-up company that offers a technological solution to optimize port call processes based on automated real-time information exchange among the stakeholders.

PROJECT ROLE

SP will primarily support LL3 and the development of the JIT arrival modelling and associated DT services and the DT4GS-DT User Interface in WP3.

DT4GS Universities and Research Centres

TU Delft

CORE COMPETENCIES

TUD is s the oldest and largest Dutch public technical university and is among the top 15 engineering and technology universities in the world (2020). The Mechanical, Maritime and Materials Engineering dpt carry out ground-breaking and pioneering research using state-of-the-art research facilities such as the megahexapod, towing tanks, the Researchlab Autonomous Shipping, the Autonomous Guided Vehicles Lab and the Bulk Characterisation Lab.

PROJECT ROLE

TUD will lead the application of DTs in the design and production of new green autonomous vessels (T1.4) and the Comprehensive DT-enabled design methodology for zero emission shipping (T1.6). They will have a key role in the development of the Zero-emission shipping DSS (retrofit / new build) (T3.4)

WEGEMT

CORE COMPETENCIES

WEGEMT is a European Association of Marine related Universities formed in 1978 for increasing the knowledge base and updating and extending the skills of practicing engineers and postgraduate students working at an advanced level in marine technology and related sciences.

PROJECT ROLE

WEGEMT will be mainly active in WP5 to raise public awareness and disseminate the key results of the project through numerous channels and support capacity building. And modelling FW.

ATHENA Research & Innovation Information Technologies

CORE COMPETENCIES

The "Athena" Research and Innovation Centre in Information, Communication and Knowledge Technologies and Sustainable Development (rational energy, alternative forms of environmental development, natural resources management, sustainable transport

PROJECT ROLE

ATHENA will support the tasks delivering the GS Operational Optimisation DT (T3.3) the DT4GS Data Space, (T2.2) and the Modelling, Analysis, Simulation, and Optimisation Tools (T2.3).

Consiglio Nazionale delle Ricerche

CORE COMPETENCIES

CNR conducts research and technology transfer in the field of air pollution and Global and regional atmospheric modelling. CNR is currently coordinating the ERA-net co-funding action H2020 ERA-PLANET.

PROJECT ROLE

CNR will participate in ST1.3.2 Pollutants emission monitoring from vessels and modelling air quality impacts and T2.4 Decarbonisation knowledge Hub

If you want more informations about the DT4GS project, please feel free to contact us at **info@dt4gs.eu**

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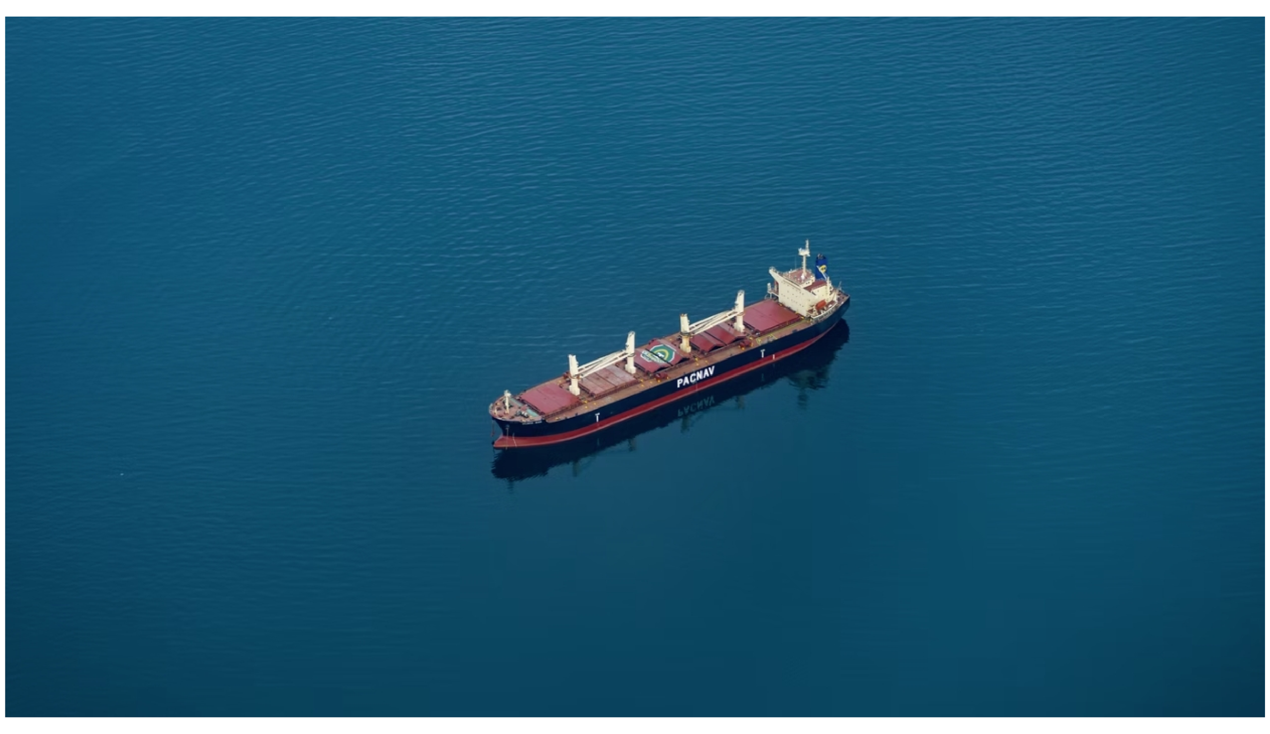

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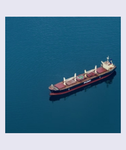

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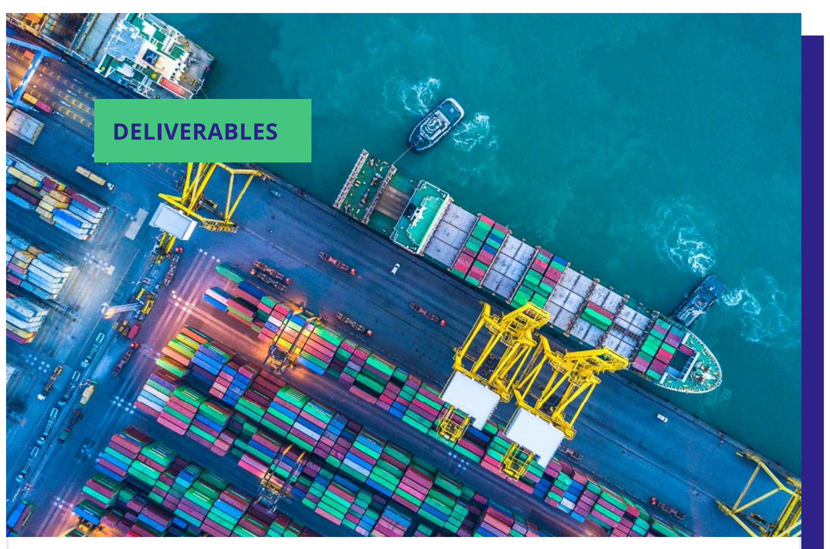

D1.6 - Comprehensive DT-enabled design methodology for zero emission shipping

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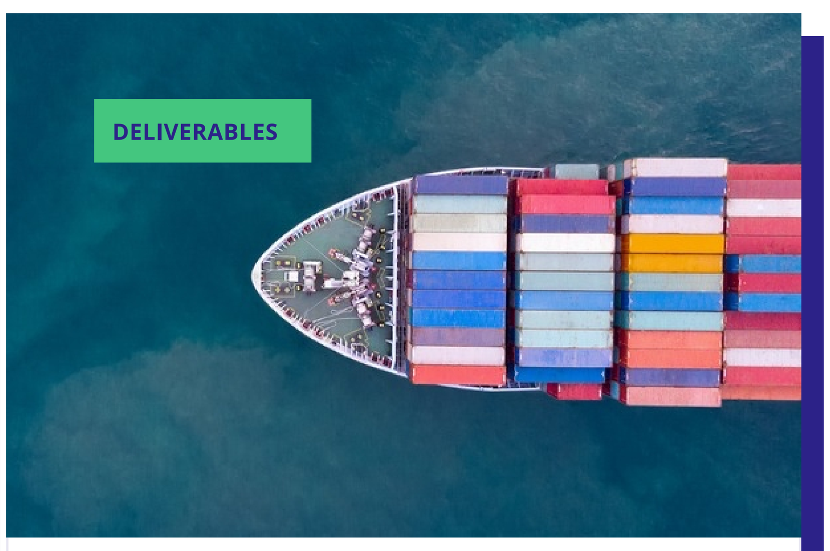

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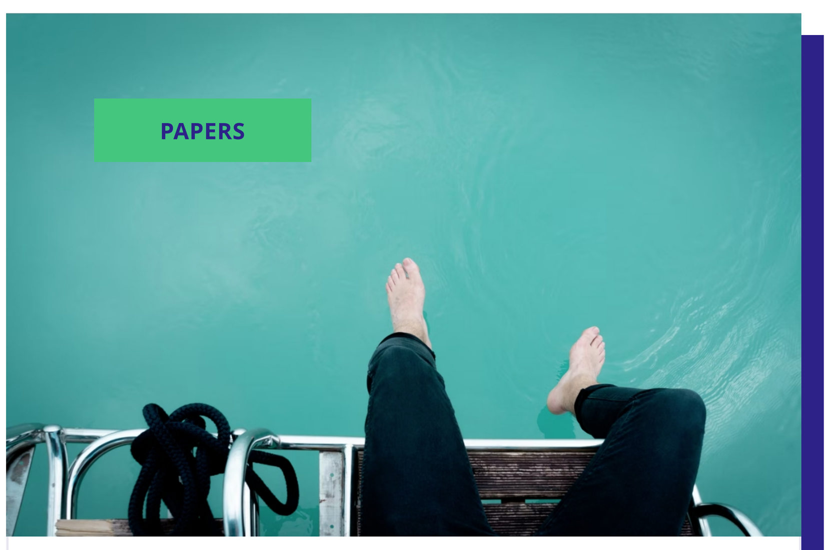

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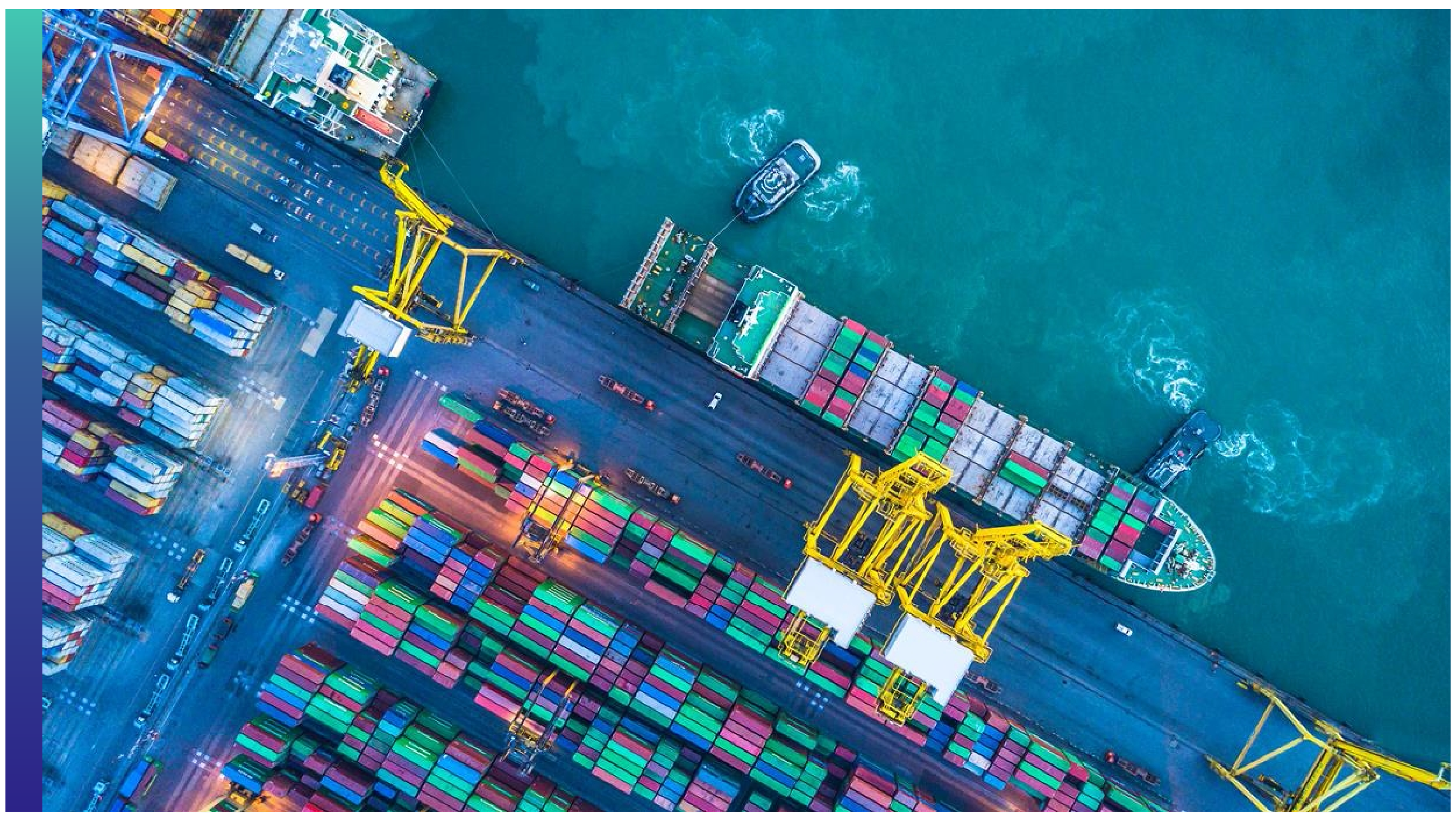
D1.6 - Comprehensive DT-enabled design methodology for zero emission shipping



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Annex VIII: DT4GS Press release

DT4GS

NEWS RELEASE

1st June 2022

<u>Consortium of 21 prominent Green Shipping stakeholders launches Research and Innovation project to supercharge shipping industry's drive towards zero emissions</u>

Research will focus on applying digital twin technology to the entire lifecycle of ships, as the DT4GS project aims to cut CO2 emissions 20 per cent by 2026

An innovative scheme to apply Digital Twin Technology, which aims to transform the maritime industry by helping improve efficiency and cut carbon emissions, launches this week (Wednesday, 1 June).

The project named Digital Twin for Green Shipping (DT4GS) is European Commission funded and forms a coalition coordinated by Belgium-based Research & Development specialists Inlecom.

DT4GS will create realistic digital representations of ships, which are then tested and validated in four Living Labs (LLs) with different types of ships aiming at navigation/route, machinery and hull optimisation, through to energy management. Further improvements of the ships'/transport systems' efficiency will be investigated via Just In Time (JIT) arrival implementation.

The project aims to significantly contribute towards achieving 55% CO2 emissions' reduction from waterborne transport by 2030, in line with the ultimate target of zero emissions by 2050.

INLECOM Director, Takis Katsoulakos said: "We are delighted to have won funding through the European Commission's Green Deal scheme. This funding has enabled us to roll out an innovative Digital Twin technology research and development programme with our partners to help ensure the shipping industry can supercharge its journey to zero emissions.

This is a fantastic opportunity for the European industry and the research & academic communities to work together to achieve the goal of zero-emission shipping, while also addressing climate change, air pollution from ships, as well as the deterioration of waters and oceans."

The LLs concept is based on a co-creation approach which will take ships through their full lifecycle, from planning to design, construction, operation, retrofitting, and decommissioning - all while looking to ensure green decision-making options are pursued when upgrading existing ships and building new ones.

DT4GS will implement a zero-emission shipping methodology and virtual testing mechanism (Virtual Testbed) with decision support systems established that cover new builds, retrofits, and the shipping to port interface.

Georgia Tsiochantari, DT4GS project manager, said: "DT4GS aims to harmonise the green shipping efforts of shipping companies, design offices, shipyards, equipment manufacturers, ports, and policy makers, while facilitating the sharing of best practice. The scheme will support shipping companies in their net-zero shipping transition plans.

"DT4GS will also help the shipping industry gain increased confidence in technical and economic predictions regarding green fuels and technology."

The project involves 21 partners covering maritime transport industry specialists and associations, shipping companies, shipping digital twin providers, Universities and research centres from Italy, Belgium, France, Ireland, Cyprus, Spain, the Netherlands, Poland and Greece.

-ENDS-

Notes to editors

About Inlecom

Inlecom Group, Belgium, was established in 1996 with the seminal charter of promoting innovative Information and Communication Solutions in shipping and the Group has since expanded upon these foundational competencies.

Today, Inlecom are an established leader in Digital Ecosystem Platforms & Technologies in domains such as ICT, Security and Sustainability, IoT, Cognitive Computing, Social Software, Cloud, Analytics, Big Data, Mobile Computing and Transport & Logistics, Smart Cities, and Energy.

With an international team of experts in the areas of Mobility, Business Consulting, Commercialisation, EU PO and USPTO Patent Filings with hundreds of successfully granted/issues patents, Solutions and Business Analytics, the team provides strategic knowledge-centric solutions and consultancy.

DT4GS partners include:

Athena Research Center
Axon Logic IKE
Belearia Eurolineas Maritimas Sa
Commissariat A L'Energie Atomique Et Aux Energies Alternatives
Consiglio Nazionale Delle Ricerche
DANAOS Shipping Company Ltd
Euronav
European Inland Waterway Transport Platform
FINCANTIERI NEXTECH SPA
Foundation WEGEMT– European Association of Universities in Marine Technology and Related Sciences

European Fundacion De La Comunidad Valenciana Para La Investigacion, Promocion Y Estudios Comerciales De Valenciaport
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IBM
KONNECTA Systems Ltd
Remontowa Marine Design & Consulting
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RINA SERVICES SPA
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DT4GS Project Manager
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Annex IX: DT4GS NEWSLETTER Template

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News
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Vol.1 - December 2022

Introduction of this volume

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Project updates

GS Operational Optimisation of Digital Twins

Based on Task3.3 roadmap, DANAOS extracted a reference global operational optimization use case in order to facilitate the transfer of DTs (Digital Twins) across LLs. More specifically the

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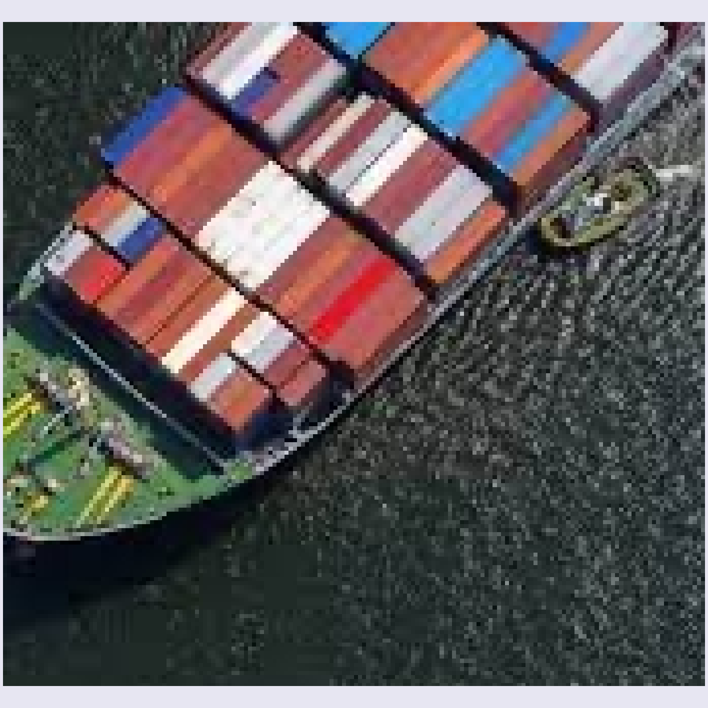

DT4GS Model Blueprints and Open Model Library

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LL2 DANAOS Containership-centric DT

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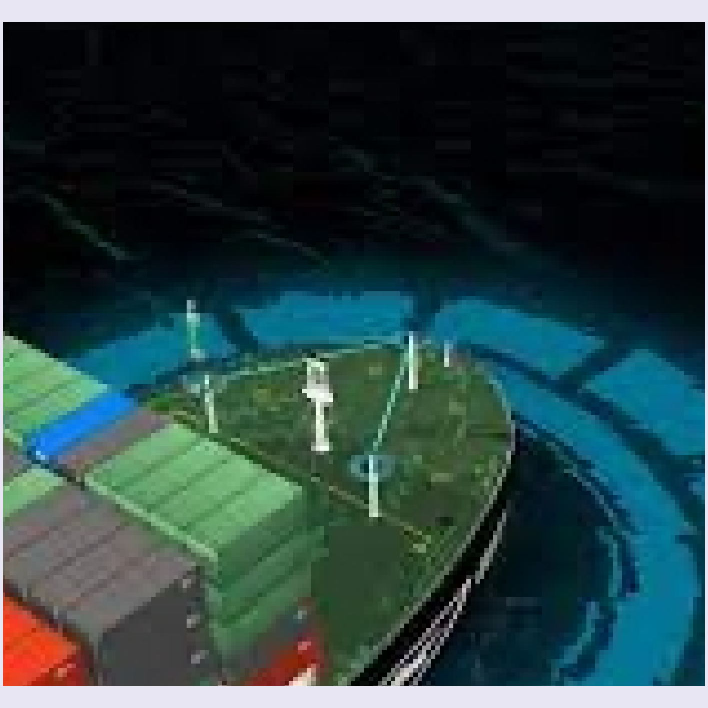

Application of Digital Twins in the design and production of green autonomous vessels

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Discussion on DT4GS Alliance- 20th October 2022

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DT4GS will provide **an industry-wide decarbonization decision-support system** for shipyards, equipment manufacturers, port authorities and operators, river commissions, classification societies, energy companies and transport /corridor infrastructure companies.

Go to our website

For more information about the DT4GS project, please feel free to contact us at **info@dt4gs.eu**

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