



News & updates

Vol.2 - March 2023



DT4GS's Technical Update

This is the 2nd newsletter on behalf of the DT4GS consortium. The project is in the 10th month of a crucial stage. During the last months, work continued from WP1: **The DT4GS Modelling Framework**, where WP1 partners produced **D1.1: Value-oriented Analysis in enabling Shipping Decarbonisation**. This report presented and described a value-oriented analysis in enabling shipping decarbonization. This is achieved through framing the key decarbonization enablers as discussed in the scientific and industrial bibliography, its risks and opportunities, potential transition challenges and headwinds, stakeholders and a deep dive on decarbonization imperatives – regulation, financing (i.e., carbon credits, Green Taxes, etc) in the context of the latest EU disclosures, infrastructure and technology.

WP2: **Open DT4GS Infrastructure** partners also released **D2.2: DT4GS (Green Shipping) Dataspace v1**. The primary objectives of this document were to establish the current state of the art, outline the technical requirements, conduct a comprehensive survey of relevant

technologies, and provide an initial definition of the constituent elements comprising the DT4GS dataspace.

Furthermore, **Work Packages 3,4,6** continued their work and in WP5: **DT4GS Dissemination, Scale-up, Innovation management, Commercialisation and Policy Recommendation** partners also launched **D5.1: Dissemination & Communication v1**. The purpose of the deliverable was 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 outlined an approach to reaching out and communicating to the target audience, by developing communication tools, defining a series of tailored actions, its timeline and the persons responsible. It also set quantified measures for monitoring progress and the impact of the dissemination actions.

It is important to highlight one specific moment throughout the duration of the project thus far. The significant moment worth mentioning is the production of the four **DT4GS videos** by **INLECOM**.

1. The DT4GS benefits

The utilization of digital twins offers support to the selection and implementation of energy efficiency measures, taking into account different perspectives, providing significant financial benefits and harmonizing the transition to new technologies such as green fuels. DT4GS enacts the potential of digital twin in green shipping managing the complexity in dealing with the interdependencies in the maritime sector.

2. What is ship digital twinning and what problems it solves

A ship digital twin is a digital replica of the actual (physical) ship, in terms of structure, equipment and functions. Digital twinning is the process, data and software used to create a digital twin. Digital twins can be used to support and predict future operational conditions through simulations and predictive algorithms, in order to minimize the environmental impact and boost the economic benefits. DT4GS strives to offer the means to the maritime industry for digital twinning.

3. How digital twinning could help decarb?

The availability of data related to the operation of a vessel is the key parameter for energy saving and accordingly low emissions. The models developed to process this data have to simulate and

approach the operation of the vessel. Their main goal is to enable real time operational optimization and maintenance activities.

4. **DT4GS - Project introduction**

DT4GS is an EU funded project which aims at making Digital Twin technology readily available to the shipping industry to support accelerated transition to zero emissions.

Finally, DT4GS partners also promoted the project through the 8th International Symposium on Ship Operations, Management and Economics (SOME 2023) that took place at Eugenides Foundation Conference Center, Athens on 5-7 March. Within the symposium's content, **Danaos Research Center** presented a paper titled: ***“From STEAM to Machine: Emissions Control in the Shipping 4.0 Era”*** authored by: **D. Kaklis, T. Varelas, I. Varlamis, P. Eirinakis, G. Giannakopoulos and, C. Spyropoulos.** and partner **ATHENA Research Center** presented their paper titled: ***“Time Series Analysis for Digital Twins in Green Shipping”***, by: **Lazaros Avgeridis, Konstantinos Lentzos, Dimitrios Skoutas and Ioannis Emiris.**



DT4GS participation at SOME 2023, Athens - Greece

The Symposium brought together ship operators, technical managers, naval architects, marine engineers, academics, classification societies, and marine transportation policy-makers to discuss and debate

important current issues for the maritime industry.

Danaos Research Center presentation paper described that the maritime sector is required to adhere to the IMO 2020 – mandated reduction of emissions. This reduction can be conducted by either using a compliant fuel with lower sulfur content, an alternative fuel (e.g. LNG, methanol), or clean its exhaust gasses with a “scrubber” technology to reduce the output of CO₂, NO_x and SO_x emissions. The objective of this paper was to present a holistic approach to continuously monitor and estimate the emissions of a vessel as well as to assess and improve the efficiency of scrubbers. Furthermore, the deployment of a cutting-edge, integrated framework, incorporating the latest technological advances, that can offer the ability to capture, process and analyze vessels’ operational data in order to improve efficiency, sustainability, and rule compliance is presented. Particularly the conceptualization and materialization of a big data application suite that exploits the IoT (Internet of Things) and AI (Artificial Intelligence) advancements and technologies, to employ a “digital replica” of the en-route vessel is demonstrated. By collecting a multitude of features from on-board sensor installments, the paper presents how can effectively be utilized these features, harvested in real time, in order to accurately assess and estimate the environmental footprint of the vessel by employing robust Fuel Oil Consumption (FOC) predictors. Then it was described in detail the streamlined procedure from data acquisition to model deployment, utilizing the proposed big data framework, in order to assess and estimate the emissions during the operational state of the vessel. Finally, partners demonstrated experimental results by deploying comparative analysis utilizing operational data from one containership-centric Living Lab (LL) in order to validate and confirm our approaches in terms of accuracy and performance in a real-world setting.

ATHENA Research Center presentation paper started with a brief introduction to Digital Twins (DTs) and, in this context, the need to process and analyse time series data from the available sensors on the ship to extract meaningful insights and drive decision-making and predictions. An overview of state-of-the-art techniques for anomaly detection in time series was then presented, as well as preliminary experimental results from applying such methods on real-world vessel data. The presentation was followed by questions and a discussion

with other attendees. Of particular interest was how to distinguish between real anomalies and potential false positives, as well as on other data cleaning techniques that could be applied.

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COMMUNICATION HIGHLIGHTS

- DT4GS website is now [online](#).
- Social media accounts set up and available: [LinkedIn link](#), [Twitter link](#), [Facebook link](#), [Youtube link](#)
- The project's flyer and leaflet, are also completed and available on the [website](#).
- Project's press release is available [here](#).
- Project's publications are available [here](#)
- DT4GS videos are available [here](#)

DT4GS News



DT4GS (Green Shipping) Dataspace

The DT4GS Dataspace represents the core of the Digital Twin infrastructure, which functions as a component that can unite all the functional building blocks that enable the application to simulate ship behaviour, perform real-time operational optimization, execute retrofitting or new-build assessments. In the works by the consortium, particular emphasis is placed on the idea of making available to ship-owners an open source, fully configurable tool that implements state-of-the-art techniques for inter-systems communication and knowledge extraction from data using machine learning techniques.

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LLs Detailed Planning and KPIs – Support and Learning activities

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GS collaboration models with port and broader stakeholders and GS trajectories

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Digital twinning, is the process, data and software used to create a digital twin

The DT4GS benefits - Video

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DT4GS truly enacts the potential of digital twins for green shipping

What is ship digital twinning and what problems it solves - Video

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DT4GS flyer published

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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 CO ₂ e in the short term	i2 20% improvement costs efficiency for GS solutions
i3 55% reduction CO ₂ e by 2030	i4 Zero-emission waterborne transport by 2050



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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