



## **Enabling Just-In-Time operations and realizing energy savings**

### **A talk with Cosimo Cervicato and Alessandro Maione on Living Lab #10, Hermes Fleet Performance Monitoring System<sup>1</sup>**

*Grimaldi is Italy's biggest ship-owning Group and the world's leading operator in maritime transport of 'rolling freight', as well as the European leader on the Motorways of the Sea. The Group also operates port terminals and logistics companies, which in time will form integrated chains. Besides that, they own two European ports: Walhamn in Sweden, and Igoumenitsa in Greece. The company's headquarters is in Naples, Italy, where interviewees Cosimo Cervicato and Alessandro Maione are stationed. Congratulating them with the victory of the Napolitan football team in the Italian League the week prior to the interview, Cosimo smiles and says: "The streets are still predominantly blue here", blue being the color of the Napoli football team.*

Alessandro Maione is an environmental engineer. Like Cosimo, he graduated with honors from the University of Naples Federico II. He just completed his PhD in energy science and engineering at the University of Naples Parthenope, within a PhD program that focuses on the exploitation of renewable energy sources. Alessandro started his job at the Grimaldi Group only a month ago, so everything is still new to him. In the first few weeks at his new job, he has familiarized himself with topics such as FEDeRATED Living Lab #10, but during the interview he keeps mostly quiet and leaves the talking to the much more experienced Cosimo.



Cosimo Cervicato has been working in Grimaldi Group for quite some years now. He started out as an electrical engineer and in 2009 became project manager for Finnlines Oy PLC –a Grimaldi Group company from Helsinki, Finland–, managing a project related to digitalization. He specifically worked on an *Asset Management System (Amos)* that Finnlines uses to manage general maintenance. Between 2011 and 2012 Cosimo was stationed in Malmö, Sweden, working on the same project, but focussing on training goals. Moving back to Naples in 2013, he moved up the corporate ladder, and since the end of 2022 he is Senior Executive Engineer in the Energy Saving R&D and Ship Design Department and project coordinator for all R&D projects developed by Grimaldi Group.

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<sup>1</sup> Interview by Minne Buwalda



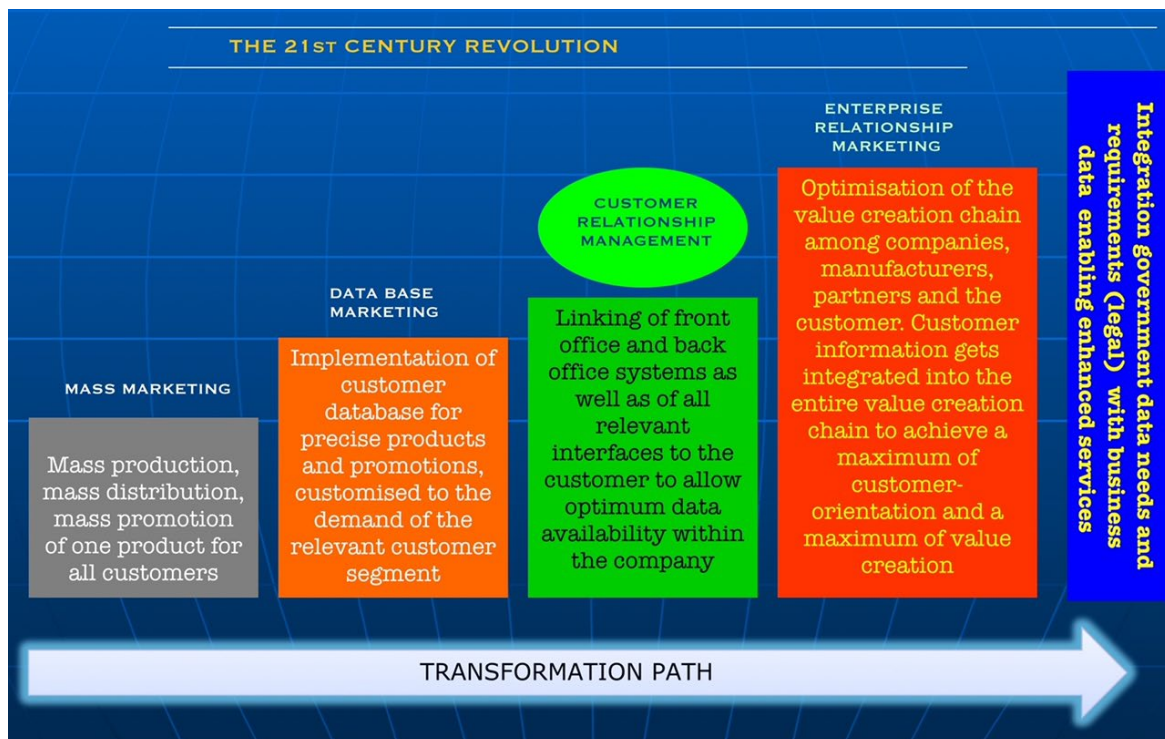


### A focus on B2B data exchange

Reading the Factsheet of Living Lab #10, it looks as if Grimaldi bets on combining environmental goals and economic goals by way of 'energy savings', which is Cosimo's specialty as an engineer, as well as Alessandro newly acquired field of expertise. And because it is a FEDeRATED Living Lab, it also complies with EC-objectives, of course. Yet, Living Lab #10 does not deal directly with public-private data exchange.

The environmental goal –reducing fuel consumption and CO<sub>2</sub>-emissions of transport and logistics operations– is an ideal place for public and private objectives to meet though. Both the EU and Grimaldi need transparency regarding CO<sub>2</sub>-emissions in the near future, so in that respect their goals more or less coincide. Yet, being part of the FEDeRATED consortium means more. It also means meeting technical requirements for a uniform data exchange within the European market of transport and logistics, for example by way of the publish-and-subscribe mechanism.

Although LL#10 focusses on B2B data exchange, it deals with publish and subscribe too, according to Cosimo: "Overall, the Hermes Living Lab vision can be summarized as enabling data in existing IT-platforms of companies to become available to authorized users through a subscribe approach." So, although this Living Lab does not really focus on B2A data exchange, it does adapt one of the main features of FEDeRATED regarding data sharing with government agencies.



*Decentralised real time data exchange enabling customer and government integration into the supply chain leading to enhanced transparency and services*

### Interfacing existing maritime solutions

Living Lab #10 is called 'Hermes Fleet Performance Monitoring System'. Asking Cosimo to what extent Grimaldi's focus is on the company goal of fleet management, he says:





"To a great extent, but at the same time the Hermes-system is used by other actors in the supply chain, for example ports and terminals, customers and other sub companies." He comes with an example: "Our biggest customer, car manufacturer Fiat Chrysler Automobiles (FCA), asked us to monitor their cars on our ships. These past years there were delays with the deliverance of cars to Europe, but thanks to the Hermes-system at least we were able to tell them exactly where their cars were, and when the ship was expected to arrive in the port of destination, so in turn they could inform their dealers about the arrival of new cars."

Providing their customer FCA with real time information about the whereabouts of the ship and its cargo can be done because Grimaldi interfaced different systems and types of equipment, for example existing maritime solutions like Automatic Identification System (AIS), Electronic Chart Display and Information System (ECDIS), and IoT devices and sensors Grimaldi placed onboard their ships. Cosimo: "The AIS is mandatory for big ships and for us it functions as our back-up system. Our main source of information is the ECDIS system, which provides data on position (latitude, longitude) and speed of the ship."

Grimaldi's Hermes system also interfaced with the Marine Traffic portal, which shows the position of all owned and rented ships through the AIS-system, but it can only give such data within a limit of 12 miles from the coast. To be able to give the ship's position when it is further removed from the coast, Grimaldi decided to share AIS information from owned ships with this portal. Cosimo: "We interfaced our Hermes system with Marin Traffic using 40 plus of our ships and thanks to the AIS system we can give the Marine Traffic portal the position of all ships that are within the reach of 12 miles from our ships while on open sea. On the other hand, we asked Marine Traffic portal to provide us information on the position of ships rented by us on which the Hermes system is not installed and to use the marin traffic information in case of misscommunication from our ships. ."





## **Ships full of sensors**

Grimaldi operates approximately 150 ships, and since the beginning of 2019 some 100 of those ships have been equipped with all kinds of IoT devices. The most important goal of the installed IoT is to create a more sustainable and less costly way of operating the Grimaldi fleet; an additional goal is creating better services to clients and partners. Cosimo: "Thanks to the IoT-systems onboard of our ships we are able to monitor them in real time, making comparisons between sister ships and ships sailing on the same route, analysing different data. It can be about data on fuel consumption, CO<sub>2</sub>-emissions, electrical loading in ports, ships positions, weather forecasts, ships ETA's and ETD's, etc. We are getting data every 30 seconds from each ship, registering different events, like port stay, navigation and manoeuvring. This then will unlock a series of automated procedures that used to be made by way of paper documents."

Asking about the 'IoT-Gateways' onboard of Grimaldi ships, which gather big data from the sensors and if necessary, redistribute data, Cosimo says: "There are several digital servers onboard, and many analogue sensors. With our newest ships, we also interfaced the complete automation of the ship. These ships do not hold any secrets for the Hermes-system anymore. They are constantly monitored in real time. Those working onboard our ships therefore call the Hermes system their Big Brother." In the future Grimaldi also wants to apply machine learning technology within its ships.

During the years of the FEDeRATED project several activities have been conducted in parallel with the software development and hardware integration, in order to become more efficient and sustainable, and to provide better information services to drivers and clients. Cosimo: "Our main target now is to increase the integration and information exchange types with other transport producers, infrastructure owners, or any other stakeholder involved in the supply chain." To which he adds: "There is a specific focus on smart data sharing. Various parties in the logistics chain, especially data providers, can identify and choose data to share, for example vessel type, AIS or ECDIS data, or the frequency of timeframe in case of a dedicated IoT-Hub."



## **Cooperation with Living Labs #18**

Grimaldi seems to have its digital affairs well in order in its own maritime modality, but the FEDeRATED project is also about creating synchromodality, and that arises at ports, terminals and other transshipment sites. To work on such FEDeRATED synchromodality, Grimaldi set up a collaboration with Living Lab #18, which involves the TOS of Terminal





San Giorgio/Circle. The data exchange here involves ETA's and position/speed of ships transporting tracked trailers, while Terminal San Giorgio/Circle developed several data services for trucking company Luigi Cozza, for example 'trailer ready for pick-up'.

Concerning access rules, Grimaldi and Terminal San Giorgio reached a peer-to-peer agreement on the exchange of datasets by way of an API. The authentication is based upon the exchange of predefined tokens. Cosimo: "This topic is crucial in view of the upscaling of the services to multiple stakeholders. For the access rights of the B2B data exchange between TSG and Grimaldi, we provided a token to TSG which provides them access to the needed data." Grimaldi decided to develop a Web App to manage access to the API connection.

Asking Cosimo how the cooperation with Living Lab #18 is evolving at the present stage, he says: "During the last phase of the project a strengthened cooperation with Terminal San Giorgio/Circle has been carried out. A bilateral FEDeRATED Group has been created and is used for data exchange with and API-access to a Circle-account, in order to demonstrate the interoperability between the two systems."

Asking if such cooperation could be possible with other Living Labs, for example the Dutch BDI or the Swedish Living Labs of Kvarken ports, Cosimo replies: "Yes, we can cooperate with all Living Labs, because we created a flexible structure, and our information can be shared with all, applying the FEDeRATED principles." To which he adds: "Yet, cooperation with LL#18 Terminal San Giorgio/Circle was the easiest and most practical to start with. There was already commercial cooperation between the respective partners."

### **Less waiting time in ports is less emissions**

At the moment the data Living Labs #10 exchanges with Living Lab #18 deal with vessel tracking. Asking if trailer and cargo tracking could be included in a possible next phase of Federated, Cosimo says: "Yes, absolutely. Within Grimaldi Group we already have a Terminal Platform that manages information about the cars, containers and trailers, for example on the placement of these assets onboard the ship. Our next step will be to create an interface between our Hermes Living Lab and our Terminal Platform, because with such synchronization we can apply the concept of Just-In-Time. Knowing exactly how many and which pieces of cargo need to be (dis)embarked in what order, makes the terminal operations more efficient."

Continuing on the topic of synchronization between shipping and terminal operations, Cosimo explains: "We want to know when there is a free slot in the port, because it gives us the opportunity to speed up or slow down the ship, in order to arrive at the exact time of embarkment or disembarkation, which saves us waiting time, thus marine gasoil and CO<sub>2</sub>-emissions." And: "Since 2017 we work with the concept of zero emissions in the port, both on the seaside and the land side. Our ships are equipped with a 5.5 megawatt-hour battery-pack that we use during port stays. That way we can be there for more than 8 hours with zero emissions. At the same time, we are





developing a ro-ro truck which is needed for the transshipment of roro-trailers with hydrogen power. We did the first tests with this hydrogen fuelled equipment in April 2023.”

## Green technology and Just-In-Time operations

As soon as we touch on the topic of ‘realized energy saving’, Alessandro speaks up. Checking the Grimaldi statistics on environmental performance, he says that the Living Lab certainly had a positive impact on Grimaldi’s operations. Alessandro then come with some major energy savings: “These past years Grimaldi optimized its operations, with important reductions between 2019-2021 such as CO<sub>2</sub>(t)/Ship -3% Vehicle carriers Grimaldi Euromed; gCO<sub>2</sub>/GTnm -9%; gCO<sub>2</sub>/GTnm-emissions RoCargo ships -4%; gCO<sub>2</sub>/GTnm-emissions RoPax ships -2%.” That sounds like great results.



Important ways in which such achievements can be realized, are using green technology and enabling Just-In-Time operations. Concerning the deployment of cleaner technology, Cosimo comes with an example: “We already ordered new ships (Ammonia ready) that could be equipped with ammonia-fuelled engines for carbon free shipping.” And concerning Just-In-Time operations, he says: “Thanks to the Hermes Living Lab we organized an office team that keeps a constant eye on the Hermes dashboard and checks the route of each ship, informing the captain about the optimal route, speed etc.”

Just-In-Time is a core concept in Grimaldi’s digital endeavours. Cosimo: “It is about an exchange of datasets between private companies and with public authorities, in order to foresee the ship arrival in the port –including documentation needed– as well as the available slots in the port, aiming to reduce the ship stay in rada outside port waters or in port. This allows for a speeding up of the commercial operations and less CO<sub>2</sub>-emissions.”

Grimaldi wants to further expand on the results of the present FEDeRATED Living Lab, possibly in cross cooperation with internal and external ports and terminal systems, including Port Community Systems and government agencies like Customs, in order to further develop the Just-in-Time concept.

## Next steps

Cosimo is satisfied with the results of the FEDeRATED project for Grimaldi Group. “We achieved our target as formulated at the beginning of the project and are already





thinking about the next steps. We want to work on new extensions and new functionalities for the Hermes system, also in the field of public-private data exchange. A logical follow-up to the current Living Lab would be to interface Grimaldi's Hermes-system with its Terminal Operating Systems. Cosimo: "We would like to create a middleware, collecting all the information coming from our terminals, and share it with the Hermes Living Lab. This way we can create a multimodal platform. At the moment we already have a single platform for our terminals, but the middleware still lacks." To which he adds: "Creating such middleware the FEDeRATED way would be a great idea for a possible FEDeRATED round two."

### The LL#10 practical impacts in a nutshell:

Transport tracking within the Grimaldi fleet operations to be used by third parties – also connected to Marin Traffic - contributed to obtain the following savings:

1. **Route optimization** - The constant monitoring of the routes → optimize routes, reduce the fuel consumption and CO2 emission.
2. **Trim optimization** - Inclinometers installed on board of ships → suggested the optimum trim for each ship in order to save fuel consumption and CO2 emission during navigation)
3. **Improved ETA forecast:** Long time at sea with eco speed, Less time in port and CO2 reduction during port stay.
4. **Fuel Consumption/navigation days [mt/day]** : Grimaldi Euromed S.p.A. -2%
5. **CO2 emission [grCO2/(ton-nm)]** : RoCargo ships -1.6%
6. **Fuel Consumption (Port stay)** : -2% [mt/day]
7. **Visibility of ships (owned and chartered) in all EU ports** – Enabled through data sharing with Marin traffic
8. **Reduced hours of no Connectivity** - Alert system implemented → reduced the lack of data due to connectivity problems
9. **MRV optimization:** Automatic data downloading for MRV monitoring reporting and verification

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