



Clustering Partnering strategies towards other relevant R&D projects

RESURGAM

Robotic Survey, Repair & Agile Manufacture



GISBIR

IRKISH SHIPBUILDERS' ASSOCIATION



EWF



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This Deliverable D6.4 reports on initial RESURGAM Collaborative Production, Maintenance and Innovation Community created.

Abstract: Special effort, as part of RESURGAM's overall approach to maximizing its impact and outreach, will be dedicated to establishing strong collaboration and partnerships with relevant RDI projects that are on course, during RESURGAM's lifetime, as well as reaching out to additional industry stakeholders

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1. Executive Summary

This Deliverable D6.4 reports on initial RESURGAM Collaborative Production, Maintenance and Innovation Community created.

Special effort, as part of RESURGAM's overall approach to maximizing its impact and outreach, will be dedicated to establishing strong collaboration and partnerships with relevant RDI projects that are on course, during RESURGAM's lifetime, as well as reaching out to additional industry stakeholders. A mapping exercise will be carried out by EWF, taking advantage of its extensive network of contacts across multiple levels in the welding and professional training communities, to better identify relevant opportunities for meaningful engagement.



2. Strategy

In a first stage, several projects were identified by RESURGAM partners as possible projects for future collaborations and connection with other initiatives both at European and National level, including Research and Innovation actions. A key focus in this area is the complementation of resources, especially in the areas different technologies that could complement RESURGAM developments.

A mapping exercise was carried out, taking advantage of the extensive network of contacts across multiple levels in the welding and professional training communities to better identify opportunities for meaningful engagement.

The following projects and initiatives were considered by the consortium with potential for collaboration due to present commonalities and relevant connections:

Table 1 - List of related projects with potential to collaborative actions

Mari4_YARD	Weld Galaxy	i-Weld
BISON	MobiDataLab	ENTRANCE
LASTING	BOOSTLOG	TRA Visions 2022
FIBRE4YARDS	FSWbot	RAPID
EUMR	RoboVaaS	MaREI
DIGIWELD	WELDONE	IOHS
4Dfatigue	PALAEEMON	MOSES
Sling	SCReen	GreenProp
GrowIn 4.0	ENDURUNS	FUN HEAD
Hull Guard	AVEXIS	FSWBot
CHIMERA	A2I2	SHIPBUILDING 4.0
PENELOPE	F-SHIP	MANUFACTUR 4.0

2.1. Engagement options for collaboration

2.1.1. Events

Considering the synergies identified the joint organization of events or the joint participation in events was identified as one of the most recurrent activities to develop in collaboration with other projects.

2.1.2. Training

As RESURGAM incorporates the training activities directed to Shipyards and the Maritime industry also other project can incorporate similar initiatives to promote the knowledge transfer of their



technology's development. Considering the close relationship between thematic some of this action could have a cross between project target groups.

2.1.3. P2P (P-project) Meetings

This was step one to reach out the project identified with “High” and “Very High” potential for synergies. This first meeting will allow the discussion of common bridges and the identification of common initiatives and the draft of a plan for collaboration.

2.1.4. End users exchange

Considering the outcomes of the different projects the end users could profit from several activities from different projects. For example, the access to dissemination, training on technologies, the support for implementation, the access to specific and relevant networks.

2.1.5. Common development of tools

A more ambitious option for collaboration but open to possibilities. This option will be analysed within the P2P meetings.

2.1.6. Others

RESURGAM was also open to other forms of collaboration and has expectations to see the other projects ideas on the P2P meetings.

2.2. Plan for collaboration initiatives

An initial plan was developed to be implemented during the development of RESURAGAM project different activities:

- Mapping of other projects and initiatives with potential for Synergies
- Elaboration of a report and a plan for collaboration, if applicable per project
- P2P Meetings (project to project)
- Elaboration of a report and a plan for collaboration, if applicable per project
- Implementation of the P2P Plans defined
- Monitoring and evaluation of the activities performed
- Review of the Collaboration with other projects plan, if applicable



2.3. Dissemination Impact

RESURGAM developed a communication and dissemination strategy (Task 6.2) fully focused on the achievement of the project's goals and effectively reaching its target groups. By disseminating information about the project, its objectives, and outcomes, the communication efforts aim to create awareness and engage target groups. This goal was successfully reached and as an example of the interest around RESURGAM technological developments is the 3.9 M visualizations of the #1 RESURGAM video.



Underwater Friction Stir Welding of Steel - Resurgam Project
3,9 mil visualizações · há 1 ano

 EWF European Federation for Welding

Figure 1 - RESURGAM video reach

2.4. Advisory Board Group

The RESURGAM Advisory Board comprise of leading experts from around the European shipbuilding and ship maintenance supply chain and value chain. They were invited based on their extensive knowledge of the systems and processes which will be impacted upon by the outcomes of RESURGAM. Advisory Board members were drawn from a wide range of related disciplines, thus covering all the strategic guidance requirements of the project. Advisory Board members do not bear an executive responsibility The Project Coordinator nominated 9 Advisory Board members in collaboration with consortium partners. This initiative was particularly fruitful with the classification society member and also with the shipyard's representatives' members articulating the modular build demonstrations and suggesting facilities for the event.

3. Implementation of initiatives with other projects

Table 2 - Projects characterisation

PROJECT	Sector	Short Description of project Scope of Activities
Mari4_YARD	Maritime	Ship repair and conversion, Shipbuilding and marine equipment manufacturing
Weld Galaxy	Welding	WeldGalaxy project will deliver, a B2B online Platform that brings together global buyers (end-users/OEM) and EU sellers (manufacturers/suppliers/distributors/service providers) of welding equipment along with auxiliaries/consumables and services, thereby enhancing the visibility of EU's welding products/prototypes/services to global users (via digital marketing strategies) and providing innovative web-based services (e.g. equipment selection and inventory management, digital design/testing of equipment capabilities) to boost EU market share and competitiveness.
i-Weld	welding	The proposed project aims to collaboratively research on welding of duplex stainless steel (DSS) through modern data system/sharing, experiments and predictive physical modelling for developing new materials and processing regimes. The project will establish a systematic data system for the key physical structure/phases relative to the welding and corrosion of DSS.
BISON	Transport	The project will develop a Strategic Research and Deployment Agenda (SRDA) which can be deployed at multiple scales, within the EU research framework programme; To make linear infrastructure more high performing and reliable while taking into account the specific needs of Western and Eastern Europe.; Support European Member States to fulfill their international commitments by engaging all stakeholders into biodiversity mainstreaming for infrastructure planning and development.; Support European Member States to become political leaders through collaboration and support of European research institutions and infrastructure operators
MobiDataLab	Transport	The overall objective of MobiDataLab is to propose to the mobility stakeholders (transport organising authorities, operators, industry, innovators) a replicable methodology and sustainable tools that foster the development of a data sharing culture in Europe and beyond.
ENTRANCE	Transport	ENTRANCE offers a common and legitimate European matchmaking platform and complementary off-line services designed to mobilise financial resources to

		accelerate the market access and scale up of “first of a kind” sustainable transport solutions, thereby reducing the European CO2 emissions and pollutants caused by the transport and mobility sector.
LASTING	Maritime	Considering the diversity of the waterborne transport sector, its geographical scope, the international dimension and the challenges and opportunities upfront, LASTING will broaden engagement of the broader waterborne transport sector in European RD&I activities, by developing a communication strategy, and implementing a long-lasting communication campaign beyond the lifetime of this project, ultimately increasing stakeholder engagement in the sector and thereby increasing impact of European waterborne transport RD&I
BOOSTLOG	Maritime Logistics	BOOSTLOG will: i) map and assess around 150 EU-funded R&D since FP5 in different freight transport and logistics domains (i.e. the Logistics Clouds), ii) Increase the visibility of projects main results, outputs and potential implementation cases through ALICE Knowledge Platform, iii) develop at least 8 comprehensive and industry actionable reports starting with: a) urban logistics, b) logistics nodes, c) multimodal freight, corridors & transport networks d) freight and logistics data sharing, e) logistics coordination & collaboration, vi) modularization and transshipment to share progress made and highlight the impact achieved through R&I projects, iv) develop valorisation strategies and guidelines for public R&I uptake, v) create the reference innovation marketplace for R&I uptake and vi) identify high priority and potential R&I gaps that need to be prioritized in future R&I actions.
TRA Visions 2022	Transport	"Organise two competitions for transport research awards to be announced at the TRA conference in 2022:
FIBRE4YARDS	Maritime	- a young researcher competition with the goal of stimulating the interest in the field of sustainable transport among young
FSWbot	Oil and Gas	researchers and students.
RAPID	Marine transport safety	- a competition for senior researchers in the field of innovative transport concepts based on results only from EU-funded
EUMR	Maritime	projects.
RoboVaaS	Maritime	Have a maritime ship equipment association in the consortium (SHIPYARDS AND MARITIME EQUIPMENT ASSOCIATION OF EUROPE)"
MaREI	Energy, Climate, Marine	FIBRE4YARDS - FIBRE composite manufacturing technologies FOR the automation and modular construction in shipYARDS
DIGIWELD	Welding	Internal pipe repair of live oil pipelines



WELDONE	Welding	To reduce the time and cost of structural condition monitoring of maritime transport infrastructures such as material-handling equipment, cargo and passenger ships, and bridges
IOHS Improving occupational health and safety grant scheme	Shipbuilding - Maritime	establish a world--class marine robotics integrated infrastructure in EU.
4Dfatigue	Shipbuilding Offshore	To develop on-demand shipping and nearshore operation services based on unmanned underwater and surface vessels
PALAEEMON	Maritime Transport	MaREI - the SFI Research Centre for Energy, Climate and Marine. 220 researchers focusing on defined global challenges such as the Energy Transition, Climate Action and the Blue Economy
MOSES	Maritime Transport	goal to make a step orward in embracing digital era by providing digital tools for open education and innovative practices for apprentices (16-20 years old) from VET schools (I-VET) and for welders who wants to acquire new skills and competences in welding field in order to become more qualified (C-VET).
Sling		Boosting innovation in welding training
SCReen		Safe Shipyards with Technology Based Trainings ; To increase awareness acknowledge of occupational health and safety by supporting the development of innovative learning materials for employees and employers in the shipbuilding industry.
GreenProp		Ship and Offshore structures are continuously exposed to environmental (e.g. wind, waves) and operational loads. Over a service life of typically 20 years such cyclic loadings with variable amplitudes will induce fatigue damage. For operators of ship and/or offshore structures it is of interest to know when the accumulated fatigue damage associated with nucleating or growing fatigue cracks impairs the structural integrity to an unacceptable level.
GrowIn 4.0	Digital Manufacturing	Palaemon is a holistic and ground-breaking approach to ship evacuation. By designing an innovative and adaptive Mass Evacuation Vessel (MEV) and harnessing the power of the latest ICT advances a novel evacuation system will be compiled. Core constructs of the project are the MEV's, the ICT infrastructure, the Decision Support System (DSS) and the fresh approach to evacuation procedures. The project will increase the usable areas of the ships by designing MEV's that can be repurposed as needed, provide a grounded DSS to assist decision-makers in fulfilling their role and saving time and enhance evacuation procedures significantly. Finally, and most importantly, it will increase safety for the passengers, crew and other stakeholders whilst

		broadening the inclusion spectrum to people with special needs
ENDURUNS	Blue Growth	The aim of MOSES project is to enhance the SSS component of the European supply chain by addressing the vulnerabilities and strains related to the operation of large containerships. A two-fold strategy will be followed, in order to reduce the total time to berth for TEN-T Hub Ports and to stimulate the use of SSS feeder services to small ports that have limited or no infrastructure.
FUN HEAD	aerospace	Aim of the SLING project is to develop a hydro-structural model to improve the design of cargo containment system of (F)LNG tanks in ships. A semi-analytical model has been established, describing the sandwich structural behaviour, considering the ultimate strength as governing limit state.
Hull Guard	Oil and Gas	Aim of the SCReen project is to develop a total life fatigue assessment concept, improving the fatigue strength and life time estimates for maritime structures. Concerning formulation (i.e. modelling) a two-stage short and long crack growth model has developed. For validation purposes, fatigue and crack growth tests have been conducted at small scale and at full scale. For maritime structure applications the improvement of the total life fatigue assessment concept has been shown in comparison to the performance of conventional concepts.
AVEXIS	Nuclear	Aim of the GreenProp project is to improve the marine propeller performance. A (numerical) model has been developed to simulate the fluid-structure interaction, hydro-elastic behaviour, of flexible polymer composite propellers. The model has been validated using small scale tests in a cavitation tunnel as well as by conducting measurements at a full scale propeller behind a ship in open water. The fatigue performance of the hub-blade connection has been validated as well.
FSWBot	Oil and Gas	The focus of the GrowIn 4.0 project will be the common challenges manufacturing SMEs throughout the NSR face today, and the opportunities they bring. Many of these SMEs are moving toward the fourth industrial revolution - Industry 4.0 - which is regarded as the industry of tomorrow.
CHIMERA	Oil and Gas	The main ambition of the ENDURUNS project is to develop an integrated hybrid AUV system capable of operating under deep ocean conditions and performing a wide-range of missions, targeting the increase of scientific knowledge as well as industrial capability and performance. Due to its versatile nature, the ENDURUNS system will be suited to perform scientific missions, such as seabed mapping, profiling, geological and geophysical surveys, commercial missions, such as inspection of



		infrastructure and assets, mineral and seabed mining exploration missions and public authority missions such as surveillance, search and find missions (e.g. aircraft wreckage), equally well. Therefore, the ENDURUNS system will enable for the first time long endurance missions demonstrated up to TRL 5 or above during the project for a wide variety of high impact deep sea applications. The AUV and USV combination are expected to significantly outperform all existing AUV vehicles, in terms of endurance, positioning, survey capability, resolution, sensitivity, etc.
A2I2	Nuclear	" The aim of FUN HEAD project is to design and develop a universal head for Friction Stir Welding (FSW) of aluminium alloys in particular series 2xxx and 7xxx. Indeed, FUN HEAD stands for FSW UNiversal HEAD. This special head will reach the following 6 main objectives:
SHIPBUILDING 4.0	Shipbuilding	
PENELOPE	Oil and Gas. Shipbuilding, Aeronautics	> Providing integration of the FSW head with most commercially available CNC machines (independently from machine control system).
F-SHIP	Shipbuilding	
MANUFACTUR 4.0	Shipbuilding	> The head will be able to automatically adjust the retraction of the pin in and out of the tool shoulder.

3.1. Engagement options for collaboration

3.1.1. Events

Considering the synergies identified the joint organization of events or the joint participation in events was identified as one of the most recurrent activities to develop in collaboration with other projects. RESURGAM project organised a joint event with 2 other sister projects and extended invitation to all project standalone events (Lisbon-Portugal M18(EWF), Sheffield-UKM21(TWI), Limassol-CyprusM24(ESI), Istanbul-TurkeyM30(TSA)).

3.1.2. Training

As RESURGAM incorporates the training activities directed to Shipyards and the Maritime industry also other project can incorporate similar initiatives to promote the knowledge transfer of their technology's development. Considering the close relationship between thematic some of this action could have a cross between project target groups. RESURGAM training activities were extensively disseminated (see deliverable 2.7) and both sister projects Mary4_yard and Fibers4_yard were invited. Also, FLORES and MATES project were reach out and a follow-up link to all training activities material available in RESURGAM website was shared.



3.1.3. P2P (P-project) Meetings

This was step one to reach out the project identified with “High” and “Very High” potential for synergies. This first meeting will allow the discussion of common bridges and the identification of common initiatives and the draft of a plan for collaboration. This was the most exploited possibilities and led to several common initiatives.

3.1.4. End users exchange

Considering the outcomes of the different projects the end users could profit from several activities from different projects. For example, the access to dissemination, training on technologies, the support for implementation, the access to specific and relevant networks. The main result shared between projects are the training activities developed.

3.1.5. Common development of tools

A more ambitious option for collaboration but open to possibilities. This option will be analysed within the P2P meetings. No potential for common development of tool was identified.

3.1.6. Others

RESURGAM was also open to other forms of collaboration and has expectations to see the other projects ideas on the P2P meetings.

3.2. Plan for collaboration initiatives

An initial plan was developed to be implemented during the development of RESURAGAM project different activities:

- Mapping of other projects and initiatives with potential for Synergies
- Elaboration of a report and a plan for collaboration, if applicable per project
- P2P Meetings (project to project)
- Elaboration of a report and a plan for collaboration, if applicable per project
- Implementation of the P2P Plans defined
- Monitoring and evaluation of the activities performed
- Review of the Collaboration with other projects plan, if applicable

3.3. Engagement with sister Projects

RESURGAM kept a close link with its sister projects Mari4_YARD and Fibers4YARD and a few related initiatives were developed and focused on a joint event in ROTTERDAM, NL and crossed communication and dissemination activities focussed also on the training activities dissemination.

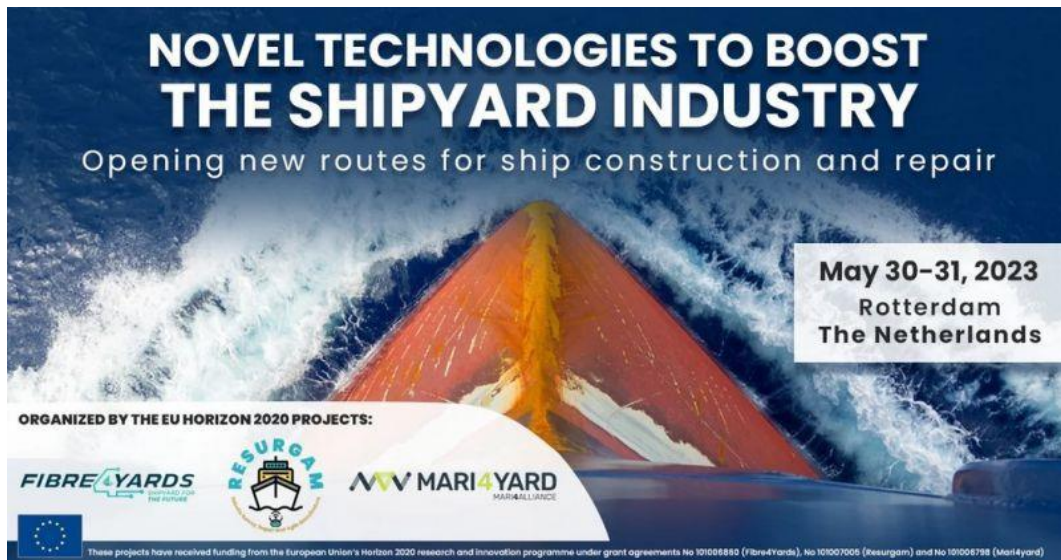


Figure 2 - Joint event dissemination



Figure 3 - Joint event



Figure 4 - Participants from sister projects at joint event

Collaborative initiatives between these sister projects offered a multitude of benefits, fostering a dynamic environment that promotes knowledge exchange, synergy, and innovation. Regular meetings served as crucial forums for project teams to share insights, discuss challenges, and align our efforts. These interactions facilitate a deeper understanding of each project's goals and methodologies, paving the way for the identification of common interests and opportunities for collaboration. Through consistent communication, project teams could pool resources, avoid duplicative efforts, and leverage each other's strengths, ultimately enhancing the overall efficiency and impact of our collective endeavours.

Additionally, dissemination activities and joint events played a pivotal role in amplifying the project's impact by reaching a broader audience. Coordinated efforts in disseminating project outcomes, findings, and best practices ensured a more comprehensive and widespread dissemination strategy. By organizing the joint event, we could not only showcase our achievements, but also engage with stakeholders, policymakers, and the public. This collaborative approach not only maximized visibility but also creates a unified front that enhances the projects' influence in shaping policy, driving innovation, and contributing to the advancement of shared goals within the European community. Overall, these initiatives strengthened the bonds between sister projects, fostering a collaborative ecosystem that propels progress and generates a lasting positive impact.



3.4. Engagement with Welding based project

Engaging with welding-based projects presented the Resurgam project with invaluable benefits, particularly in the realm of welding technology developments. Through collaborative efforts, Resurgam gained access to diverse insights, methodologies, and advancements within the welding industry. This exchange of knowledge accelerates the pace of innovation, allowing the project to tap into the latest technological trends, best practices, and emerging solutions. By fostering connections with welding-based initiatives, RESURGAM positions itself at the forefront of cutting-edge developments, ensuring that its contributions to welding technology are not only robust but also reflective of the broader industry landscape. This was particularly enhanced with EWF and TWI links to the projects and also their networks.

Furthermore, the engagement with welding projects extends beyond technological advancements to forge a network of connections within the welding world. By actively participating in joint events, conferences, and collaborative forums, RESURGAM establishes meaningful relationships with key stakeholders, industry experts, and potential partners. This interconnected network not only enhances the project's visibility but also opens avenues for strategic collaborations, resource-sharing, and market insights. Through this engagement, RESURGAM not only contributes to the growth of welding technology but also solidifies its position as a central player in a collaborative ecosystem that drives positive change within the welding industry on a global scale. An example of this is both applications for the TRA conference and the future participation on the 2024 edition.

RESURGAM was formally presented in all IIW (international Institute of Welding) annual conferences: 2021 online as covid was still a constrain, 2022 represented by TWI and 2023 represented by EWF. Also, RESURGAM project was presented in all EWF's general assemblies and in TWI different events.

3.5. Engagement with Other relevant initiatives

RESURGAM project also reached out to other initiatives that relate with its main objectives or operate in the maritime sector. One example of it is the WATERBORNE platform.

WATERBORNE has been set up as an industry-oriented Technology Platform to establish a continuous dialogue between all waterborne stakeholders, such as classification societies, shipbuilders,



shipowners, maritime equipment manufacturers, infrastructure and service providers, universities or research institutes, and with the EU Institutions, including Member States.

RESURGAM project submitted two papers for conference presentations, one at the first year of the project that got rejected as it was still early stages and the second one in 2023 that was accepted and RESURGAM will attend the 2024 conference in April to present project findings.

ACLUNAGA and TSA as Maritime sector associations had a key role in reaching out and disseminating RESURGAM developemnts and outcomes to their networks as INDUSTRY 4.0. PROYECTS, SHPBUILD-ING 4.0. and Digital Innovation Hub, DIHGIGAL.



4. Main Conclusions

The European maritime and shipyard sector has been undergoing significant transformations to adapt to emerging trends and challenges. Sustainability and environmental concerns have become paramount, driving the industry towards adopting cleaner and more efficient technologies. The push for decarbonization has led to increased research and development in alternative fuels, energy-efficient propulsion systems, and eco-friendly ship designs.

Digitalization and smart technologies are also playing a crucial role in shaping the future of shipbuilding and maritime operations. Automation, the Internet of Things (IoT), and artificial intelligence are being integrated to enhance efficiency, safety, and maintenance processes. These advancements contribute to the development of autonomous vessels and smart shipping solutions.

Additionally, geopolitical shifts, trade dynamics, and regulatory changes impact the European maritime sector. Brexit, for instance, has implications on trade routes and regulations for UK-based shipyards. Global economic trends, such as the impact of the COVID-19 pandemic, can influence demand for new vessels and maritime services.

To stay competitive, European shipyards are likely to focus on innovation, sustainability, and international collaboration. Adaptation to evolving regulations, addressing skills shortages, and embracing new business models will be key factors for the sector's success. As the maritime industry continues to evolve, it is expected to contribute significantly to Europe's economic growth while addressing the challenges posed by environmental sustainability and technological advancements. For the latest and most accurate information, it's recommended to consult recent reports and industry analyses.

To have a sustainable and strong approach to the maritime sector is key to promote efficiency and profitability. To promote specific technological developments to the needs and requirements of this industry is a quite relevant initiative that can be enhanced by a more coherent approach reaching out the shipyards and creating a community. RESURGAM strongly contributed to this strategy.