Deliverable title:	OVERHEAT Exploitation Plan Preliminary Version
Deliverable ID:	D 9.3
Document version:	Final
Partner responsible:	ISSNOVA
Due date:	31.10.2024

Funded by the European Union

This project has received funding from the European Union's Horizon Europe research and innovation programme under Grant Agreement Project No: 101076633. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

Document Control Sheet

Deliverable number	**D9.3**
Deliverable name	**OVERHEAT Exploitation Plan Preliminary Version**
Dissemination Level	**PU**
Call	**HORIZON-CL5-2022-D6-01**
Topic	**HORIZON-CL5-2022-D6-01-08-Safer navigation and tackling containership fires**
Consortium Coordinator	**IMAT**
Partner responsible for the deliverable	**ISSNOVA**
Edition	**1.0**

Authors of the document

Authors of the document - Representatives of beneficiaries involved in the project		
Name/Beneficiary	Position/Title within the project	Date
Raffaella Russo /ISSNOVA	WP9 leader	20/10/2024
Mariana Oliveira /ISSNOVA	Project team and main WP9 contributor	20/10/2024

Reviewers of the document

Appointed reviewers of the document - Representatives of beneficiaries involved in the project		
Name/Beneficiary	Position/Title within the project	Date
Fabienne Vallee/ Port of Brest	Project participant	29/10/2024
Massimo Capozza/Peopletrust	WP4 leader	29/10/2024
Francesco Russo/Topview	WP4 main contributor	29/10/2024
Gunnar Tietze/Seatopic	WP5 leader	29/10/2024

Responsible for the document approval

List of people approving the document - Representatives of beneficiaries involved in the project		
Name/Beneficiary	Position/Title within the project	Date
Vittorio Sangermano/ISSNOVA	Project technical coordinator	31/10/2024
Marco Pasciuto/IMAT	Project coordinator	31/10/2024

OVERHEAT is a Horizon Europe project supported by the European Union under grant agreement no. 101076633.

ABSTRACT

The OVERHEAT Exploitation Plan (D9.3) outlines a preliminary strategy for maximizing the project's impact on maritime safety through enhanced fire detection, management, and stakeholder engagement in container shipping environments. The plan presents a structured approach aimed at sustainable utilization of project outcomes, focusing on the development of five Key Exploitable Results (KERs): an unmanned aerial system recharging station, a traffic flow tracking and display system, an IT system for data sharing among stakeholders, IoT sensors and networking elements for vessels, and digital solutions with simulation capabilities for port and vessel safety management.

To ensure broad adoption of these technologies, OVERHEAT incorporates a six-step exploitation methodology encompassing stakeholder mapping, strategic partnerships, market viability studies, and adherence to regulatory standards. This methodology supports key stakeholders—including port authorities, shipowners, and public agencies—by integrating their insights through a Stakeholders Support Board (SSB) and planned collaborative events. Additionally, the project aims to foster knowledge exchange through workshops, conferences, and non-technical publications, reinforcing the relevance of its outcomes in real-world applications.

Through its commitment to open access, cross-industry collaboration, and innovation, OVERHEAT aims to establish sustainable pathways for its solutions, ultimately advancing maritime safety standards and fostering resilient operational practices within the shipping industry.

TABLE OF CONTENTS

ABSTRACT 4

TABLE OF CONTENTS 5

LIST OF TABLES 6

ACRONYMS 7

INTRODUCTION 8

1. OBJECTIVES OF THE PLAN 9

2. STAKEHOLDERS MAPPING AND CONSULTATION 10

2.1 IDENTIFICATION OF KEY STAKEHOLDERS 10
2.2 PROCESS FOR STAKEHOLDERS' CONSULTATION 11
2.3 PLANNED ACTIVITIES 12

3. IDENTIFICATION OF KEY EXPLOITABLE RESULTS AND EXPLOITATION ROADMAP 14

3.1 KER1 A PROTOTYPE OF THE UAS RECHARGING STATION DESCRIPTION 14
3.2 KER1 EXPLOITATION ROADMAP 15
3.3 KER 2 TRAFFIC FLOW TRACKING AND DISPLAY SYSTEM DESCRIPTION 16
3.4 KER2 EXPLOITATION ROADMAP 17
3.5 KER 3 PROTOTYPE OF THE IT SYSTEM TO SHARE DATA AMONG STAKEHOLDERS 18
3.6 KER 3 EXPLOITATION ROADMAP 19
3.7 KER 4 PROTOTYPES OF THE IOT SENSORS AND OF THE NETWORKING ELEMENTS FOR THE VESSEL DESCRIPTION 20
3.8 KER4 EXPLOITATION ROADMAP 21
3.9 KER 5 DIGITAL SOLUTION AND SIMULATION 22
3.10 KER 5 EXPLOITATION ROADMAP 23

CONCLUSIONS 26

REFERENCES 27

LIST OF TABLES

Table 1 – Key Stakeholders 12
Table 2 – Exploitation Measurement Criteria 14
Table 3 – KER 1 Measurement Criteria 16
Table 4 – KER 2 Measurement Criteria 17
Table 5 – KER 3 Measurement Criteria 19
Table 6 – KER 4 Measurement Criteria 21
Table 7 – KER 5 Measurement Criteria 24

ACRONYMS

AIS - Automatic Identification System

CDE – Communication, Dissemination and Exploitation

IA – Innovation Action

IPR - Intellectual Property Rights

KER – Key Exploitable Result

RTH - Return to Home

SSB - Stakeholders Support Board

UAS - Unmanned Aerial System

INTRODUCTION

Exploitation, as defined by the European Commission[1], refers to:

"The utilization of results in further research activities other than those covered by the action concerned, or in developing, creating and marketing a product or process, or in creating and providing a service, or in standardization activities."

In this context, "results" encompasses a broad range of outputs—both tangible and intangible—including data, knowledge, and information generated during the project. This definition also includes any associated rights, such as intellectual property rights. The European Commission emphasizes the importance of exploitation by mandating it as a compulsory activity for research projects. According to Article 28 of the Grant Agreement, each beneficiary is required to take measures to ensure the exploitation of results for up to four years following the project's conclusion. This exploitation can occur directly or indirectly through mechanisms such as transfer or licensing. The anticipated impact of these exploitation activities extends beyond economic and commercial benefits; it also encompasses societal, environmental, technical, educational, and scientific dimensions.

The final output of the OVERHEAT project is to define, develop, and test an integrated digital system (DS) that enables early detection of fires on container vessels. By combining technologies such as onboard sensors and drones, OVERHEAT aims to enhance fire detection performance while providing critical information for situational awareness and fire extinguishing operations.

To align with the framework and requirements established by the European Commission, with the results of the project, OVERHEAT will adopt a structured six-step methodology aimed at defining and implementing an effective exploitation strategy. This strategy will facilitate the successful adoption of results among key stakeholders in the maritime safety sector, including port authorities, ship owners, and public authorities. The methodology is designed to ensure that the project's outcomes are sustainable and can be reused through policy uptake, further research, or commercial applications.

The proposed methodology consists of the following steps:

1. **Define Overall Exploitation Measures**: Establish high-level objectives for the project's exploitation activities.
2. **Set Exploitation Goals**: Define specific goals for exploitation that are consistent with the overall OVERHEAT project.

[1] https://research-and-innovation.ec.europa.eu/strategy/dissemination-and-exploitation-research-results_en#:~:text=The%20use%20of%20results%20in,improving%20public%20knowledge%20and%20action.

3. **Identify Key Exploitable Results (KERs)**: Determine concrete outputs that can be sustained and utilized after project completion.
4. **Identify Key Stakeholders**: Recognize stakeholders who can effectively use project results or who may act as competitors or complementors. This step also involves assessing unique features and added value compared to other initiatives.
5. **Determine Channels for Exploitation**: Identify appropriate channels and means for disseminating project results to various stakeholders and target audiences.
6. **Establish Success Criteria**: Set criteria for evaluating the effectiveness of the exploitation strategy and plan throughout the project's duration.

Overall, this methodology provides a structured approach that enhances the likelihood of sustainable impact, ensuring project results are recognized and effectively utilized by stakeholders. OVERHEAT exploitation activities will rely on this approach. In particular, after the definition of project KERs (section 3), an exploitation roadmap based on this methodology will be presented.

1. OBJECTIVES OF THE PLAN

The European Commission considers Communication, Dissemination and Exploitation (CDE) of results to from research and innovation projects as important activities and integral part of the HORIZON Innovation Actions (IA) Funding Scheme. Therefore, enhanced dissemination and exploitation are considered strategic matters for the success of the programme and for the achievement of sizeable economic, social and environmental impacts. For this reason, each project is required to produce detailed CDE Plans showing how the partners intend to communicate and use the results of the project, both during and beyond its execution, and carefully monitor the achievements and effectiveness.

The present document constitutes the preliminary version OVERHEAT Exploitation Plan (D9.4, to be delivered at month 36), conceived as complementary to the Project's Dissemination Plan (D9.1, delivered in June 2024). This document focuses on the OVERHEAT Exploitation Strategy set up by the project Consortium with the purposes of:

- addressing exploitation in a coherent manner throughout the project,
- supporting all the interested beneficiaries in eliciting and coordinating their exploitation strategies,
- increasing the project results become innovations, through appropriate exploitation measures, that can produce tangible benefits and satisfy specific needs and wants.

The exploitation activities are linked to the project technical achievements and targeted to industry and project stakeholders in general. The plan will contain a preliminary version of the exploitable assets of the project aiming to create a roadmap to assure the impact maximization and stakeholders engagement. Within the plan, corrective measures will be identified to assure the reach of the exploitation requirements.

A more consolidated and final version will be generated in OVERHEAT Final Exploitation Plan (D9.4), that will contain the technological assets for which the project will have already decided as commercial and for which the Intellectual Property Rights (IPR) are already clear.

2. STAKEHOLDERS MAPPING AND CONSULTATION

Building strong links and identifying synergies among principal stakeholders will be a priority for the OVERHEAT project. This initiative encompasses a diverse group of participants, including research institutions, port authorities, and various organizations. Given the significant innovative potential of the project, which is crucial for ports, public authorities, and ship owners, a Stakeholders Support Board (SSB) will be established.

The SSB's primary task is to leverage their complementary skills and expertise to enhance the project. By facilitating dialogue between science and technology and end users, the SSB will provide valuable perspectives that support the project consortium. This collaboration is essential for ensuring that demo activities align with the real-life challenges faced by stakeholders in their daily operations.

In addition to the SSB, the project will benefit from an Advisory Board primarily composed of industry representatives. This board will play a critical role in shaping the Exploitation Plan, which will outline specific activities aimed at maximizing project impact. Key activities include:

- **Non-Technical Publications**: Disseminating major project achievements to a broader audience.
- **Exploitation and Cross-Fertilization Event**: A one-day event scheduled for the project's concluding months to foster collaboration and knowledge sharing.
- **Mid-Term Workshop**: Regular workshops throughout the project duration to gather insights and suggestions for future developments.

This structured approach to stakeholder engagement is designed to ensure that all voices are heard and that the project's outcomes are relevant and impactful for all involved parties.

2.1 Identification of key stakeholders

The SSB for the OVERHEAT project is chaired by Brest Port and includes a diverse group of key stakeholders essential for the project's success.

In particular, the OVERHEAT SSB consists of:

- **Port Authorities**: Representatives of such category enhance the credibility of the proposed tools and procedures, encouraging stakeholder buy-in, as port authorities are trusted entities within the maritime community. OVERHEAT project has already received formal acceptance from the Port of Gdynia and Port of Bremen;
- **Ship Owners**: OVERHEAT will deliver very practical tools and procedures aimed at increasing containership, vessels and crew security and safety. Ship owners possess in-depth knowledge of their vessels' operations, maintenance needs, and existing safety protocols. Their expertise can inform effective strategies tailored to real-world conditions. Moreover, they can provide valuable input on risk assessment and management, helping to identify specific vulnerabilities in their vessels and suggest effective mitigation strategies. Within OVERHEAT, the project partner CARONTE will assure a good representation of the category. Indeed, key ship owners representatives have been already contacted. Formal integration within the SSB will be formalised soon.
- **Public Authorities**: Their involvement can help to shape policies that promote fire safety and security in maritime operations, ensuring that best practices are integrated into national and international guidelines. Furthermore, they play a key role in developing and implementing emergency response plans. Their expertise can give OVERHEAT tips to enhance preparedness for fire incidents, ensuring quick and effective responses. OVERHEAT has already included in the body representatives from the Bremen Port Ministry and other Bremen ports that showed a great interest in the initiative.

The primary activities of the SSB will focus on supporting project activities, ensuring that stakeholder perspectives are integrated into the project's development.

2.2 Process for stakeholders' consultation

The structured approach ensures that stakeholder input is not only welcomed but actively sought throughout the project's lifecycle. Therefore, the SSB will engage in several critical activities aimed at enhancing the project's relevance and effectiveness:

- **Best Practices Development**: The SSB will support the definition of best practices for fire prevention and management, as well as securing containers.
- **Project Progress Review**: SSB members will review overall project progress and assess operational impacts.

- **Feedback Mechanism**: The SSB will provide feedback on the potential benefits of proposed solutions during validation activities at selected ports, including Valencia, Brest, Bremen, and Gdynia.

As before mentioned, the composition of the SSB has already been outlined. However, some refinements are required, as for example the definition of ship owner representatives. Additionally, the task will identify and engage relevant projects, networks, and initiatives to broaden collaboration.

2.3 Planned activities

A comprehensive engagement strategy aims to ensure that all relevant stakeholders are actively involved in shaping the project's direction and outcomes, thereby maximizing its effectiveness and relevance in real-world applications.

The OVERHEAT Consortium has identified two main classes of relevant stakeholders and audiences that will be integral to developing an effective exploitation strategy and plan:

- **Stakeholders as Ultimate Beneficiaries of OVERHEAT Results**

  This category encompasses all stakeholders who have the potential to utilize the project results within their operational frameworks and influence the adoption and application of these results in further research and standardization efforts. These stakeholders include port authorities, ship owners, and public authorities who will directly benefit from enhanced fire prevention and management strategies. Key representatives of such categories are included in the SSB;

- **Stakeholders as Possible Competitors and Complementors**

  This group includes stakeholders currently engaged in initiatives that align with or overlap the objectives of the OVERHEAT project. Their involvement is essential for identifying synergies, overlaps, and collaborative opportunities. By recognizing these relationships, the project can adopt a coordinated approach to maximize impact and create a credible package of solutions. Also for this category, the strategic involvement of SSB members is essential.

The following table outlines key stakeholders identified as relevant for the exploitation of OVERHEAT, categorized by their potential to utilize the results produced (commercially, for policy, or for research) and/or influence their usage. For clarity, consortium members are not included in this table.

Table 1 – Key Stakeholders

Key Stakeholders	Rationale
Port Authorities	Authorities such as the Port of Gdynia and Port of Bremen will directly apply OVERHEAT's findings to enhance safety protocols.

Ship Owners	Ship owners will benefit from improved fire management practices that can be implemented in their operations.
Public Authorities	Entities like the Bremen Port Ministry will utilize project results to inform regulatory frameworks and safety standards.
Industry Representatives	Industry stakeholders can leverage OVERHEAT outcomes to develop technical solutions that align with project objectives.
Academic Research Community	Engaging with academic researchers will facilitate further exploration of project findings, enhancing overall impact.

The OVERHEAT project will implement a comprehensive and structured stakeholder consultation process designed to ensure effective engagement and collaboration. This process will encompass the following key activities:

- **Workshops and Events**: The project will conduct dedicated workshops aimed at raising awareness about OVERHEAT and collecting end-user requirements for specific case studies. These interactive sessions will facilitate direct communication with stakeholders, ensuring their needs are understood and addressed.
- **Collaborative Events**: At least one event will be organized in partnership with other EU-related projects. This collaborative gathering will provide an opportunity to share experiences, exchange lessons learned and explore potential synergies that can enhance the project's impact. In particular, synergies will be established with the OCEAN (Operator-Centered Enhancement of Awareness in Navigation), SafeNav (Safe Navigation) and HS4U (Healthy Ship 4 You) projects.
- **SSB Workshop**: A specialized workshop will be held specifically for the SSB. This event will focus on deepening awareness of OVERHEAT while simultaneously gathering detailed end-user requirements, ensuring that the project remains aligned with stakeholder expectations.
- **Final Conference**: A concluding conference will take place during the final project meeting. This event will serve as a platform to present the major achievements of OVERHEAT, highlighting insights gained throughout the project and fostering discussions on future applications of the results.

Therefore, ongoing monitoring of the outcomes from exploitation activities is essential for the OVERHEAT project. This continuous assessment enables the identification of strengths and weaknesses within the exploitation strategy, facilitates the implementation of corrective actions, measures effectiveness, and allows for comprehensive reporting on results. To ensure effective tracking of exploitation progress, OVERHEAT will establish a preliminary set of indicators tailored to

the project's specific context. These indicators will be periodically assessed to evaluate success against established criteria, leading to updates in the exploitation plan. This plan will include a refined list of concrete actions aimed at maximizing the project's results and assessing their impact on target users.

Table 2 – Exploitation Measurement Criteria

Activity	Indicator	Target
SSB	Number of stakeholders covered	70%
	Average attendance at SSB meetings	70%
	Average number of meetings attended by each member	2+
Workshops	Number of participants in workshops	20+
Final Event	Number of participants at the final event	50+
Sharing of Results	Availability on the project website	100%
	Distribution via email with associated factsheet	100%
	Updates on key project results through other web channels	5+
Conferences and Key Events	Number of presentations at third-party events (as project)	10+
	Number of presentations at third-party events (as partner)	10+

This structured approach to defining success criteria will help OVERHEAT effectively measure and communicate its impact within the maritime safety sector. By focusing on specific activities and their corresponding indicators, the project can ensure that its exploitation efforts are not only aligned with its strategic objectives but also responsive to stakeholder needs and expectations. Regular reviews of these criteria will facilitate adaptive management, enabling the consortium to refine its strategies and enhance the overall effectiveness of its exploitation activities.

3. IDENTIFICATION OF KEY EXPLOITABLE RESULTS AND EXPLOITATION ROADMAP

3.1 KER1 A Prototype of the UAS Recharging Station description

The OVERHEAT project aims to develop a comprehensive prototype for a UAS (Unmanned Aerial System) Recharging Station, designed for both ground and onboard installations.

The first phase focuses on the mechanical design and specification of the recharging station and hangar for ground installation at port facilities. This involves tailoring the design to accommodate various drone payloads and ensuring compatibility with existing infrastructure. Key components

include the power interface specification and the integration of IoT sensors, micro-weather services, and AIS (Automatic Identification System) services to enhance operational efficiency.

In addition to ground installations, the project will also develop a recharging station prototype for onboard vessels. This phase will address the unique challenges posed by marine environments, ensuring that the mechanical design allows for seamless integration with ship structures. Similar to the ground version, this installation will also include power and sensor interface specifications tailored to onboard conditions.

Furthermore, the project encompasses the design and development of software for managing operations at both ground and onboard recharging stations. This software will facilitate mission planning for autonomous drones, incorporating safety protocols such as Return to Home (RTH) procedures and immediate landing commands. An API will be defined to enable integration with the OVERHEAT Control Room, allowing for real-time monitoring and data sharing.

The culmination of these efforts will result in a fully functional prototype of the UAS Recharging Station, equipped with advanced features that support efficient drone operations in both terrestrial and maritime contexts. By leveraging cutting-edge technology and collaborative expertise, OVERHEAT aims to enhance drone capabilities in critical applications such as maritime safety and environmental monitoring.

3.2 KER1 exploitation roadmap

This section contains the activities supporting the exploitation of the UAS Recharging Station description during and after the OVERHEAT completion.

In details, the KER1 exploitation will rely on:

- **Customer/User Identification**: Topview, responsible for the tool, together with all the interested project partners will conduct a detailed analysis of potential customers and users of the technology. The primary target group is the maritime industry, in particular shipowners.
- **Synergy and Collaboration Exploration**: all technical partners chaired by TopView will examine complementary models and tools to identify opportunities for synergies, cooperation, or potential merging. This effort aims to optimize the tool's evolution and explore its application in research and industry sectors.
- **Market Research for Economic Sustainability**: Market research and economic sustainability of the tool will be performed, to understand the real demand and the feasibility of commercialization.
- **Funding Exploration**: Partners involved in the tool realization will investigate possible funding opportunities, by considering national and EU grants, but also possible investments coming from the private sector.

The table below shows the activities to be performed, together with identified indicators and target to be met.

Table 3 – KER 1 Measurement Criteria

Activity	Indicator	Target
Stakeholder Identification	Number of stakeholders engaged	10+
Prototype Development (Ground)	Completion of ground installation prototype	Completed
Prototype Development (Onboard)	Completion of onboard installation component	Completed
Software Development	Completion of mission planning software	Completed
Testing and Validation	Number of successful test flights	5+
Documentation and Training	Completion of user manuals and training sessions	100% completed
Marketing and Dissemination	Number of presentations at industry events	5+
Feedback Loop Establishment	Number of feedback sessions held	3+
Long-term Sustainability Planning	Number of commercial partnerships established	2+

3.3 KER 2 Traffic flow tracking and display system description

The OVERHEAT project is developing an advanced Traffic Flow Tracking and Display System designed to integrate data from multiple sources, including ground-based drones, onboard drones, and various IoT sensors. This innovative system will provide a comprehensive view of traffic and operational conditions in specific areas, such as harbours and their surroundings. The primary objective of this system is to gather real-time information from all available sources and present it in a unified format. This combined view will be displayed on a user-friendly interface, enabling stakeholders to monitor activities effectively. Additionally, the system will feature a Software Interface specification (API) that facilitates interoperability with external systems, allowing for seamless integration with decision support tools used in operational management. Key components of the system include:

- **Data Integration**: The system will collect and synthesize information from drones and IoT sensors to create a holistic view of traffic dynamics. This includes monitoring vehicle flow, congestion levels, and environmental conditions.

- **Real-Time Display**: A visual display will present the gathered data in an intuitive format, enabling quick assessments of traffic situations and facilitating timely decision-making.
- **API Development**: An API will be developed to ensure that the Traffic Flow Tracking System can communicate with other systems. This interoperability will enhance the utility of the data collected, allowing for broader applications in traffic management and operational support.
- **Decision Support**: By providing accurate, real-time information, the system will serve as a decision support tool for port authorities and other stakeholders. It will help optimize traffic flow, manage congestion, and improve safety measures in busy harbour environments.

Overall, the Traffic Flow Tracking and Display System represents a significant advancement in how traffic data is monitored and utilized, by leveraging cutting-edge drone technology and IoT integration.

3.4 KER2 exploitation roadmap

In this section the activities fostering exploitation for the Traffic flow tracking and display system during and after the OVERHEAT completion are presented.

In details, the KER2 exploitation will rely on:

- **Customer/User Identification**: Peopletrust, together with all the interested project partners will conduct a detailed analysis of potential customers and users of the technology. Our primary target group are shipowners, port authorities and maritime sector in general.
- **Synergy and Collaboration Exploration**: Peopletrust, in collaboration with technical partners, will examine complementary models and tools to identify opportunities for synergies, cooperation, or potential merging. This effort aims to optimize the tool's evolution and explore its application in both research and industrial sectors.
- **Market Research for Economic Sustainability**: Market interest on the technology will be investigated, together with a feasibility study related to commercialization of the proposed tools. The activities will be chaired by Peopletrust and the all interested partners.
- **Funding Exploration**: To advance the Traffic flow tracking and display system and assure its deployment after the project lifespan, funding opportunities from EU and national grants to private sectors investments will be investigated. This search phase will be essential to prepare the tool for the possible market launch.

The table below presents the activities and the measurements criteria for the KER2, indicating targets.

Table 4 – KER 2 Measurement Criteria

Activity	Indicator	Target

Data Integration Development	Completion of data integration system	Completed
	Number of data sources integrated	5+
User Interface Design	Completion of user-friendly display interface	Completed
	User satisfaction rating (via feedback)	80% satisfaction
API Development	Completion of API for external system access	Completed
	Number of external systems integrated	3+
Testing and Validation	Number of successful tests conducted	10+
	Accuracy of traffic flow data	95% accuracy
Decision Support Implementation	Number of decision support tools developed	3+
	Stakeholder usage rate of decision support tools	70% usage
Documentation and Training	Completion of comprehensive documentation	100% completed
	Number of training sessions conducted	2+

3.5 KER 3 Prototype of the IT system to share data among stakeholders

The OVERHEAT project is developing a robust IT system designed to facilitate seamless data sharing among stakeholders involved in maritime operations. This system will enable the integration of various data sources, allowing for a comprehensive view of operational conditions and enhancing decision-making processes. At the core of this system is an API that ensures interoperability with external systems. This API will allow stakeholders to access and utilize the data collected from multiple sources, including drones and IoT sensors, thereby acting as a decision support tool for operational management. The design of the system will adhere to the principles of the ISO/OSI model, which provides a standardized framework for ensuring effective communication between different systems. The interoperability concept will focus on several key aspects:

- **Data Integration**: The system will gather information from diverse sources, ensuring that all relevant data is available for analysis and decision-making.
- **API Development**: An application programming interface will be created to facilitate easy access to the data by external systems, promoting collaboration and information sharing among stakeholders.
- **Compliance with Standards**: The system will take into account established standards such as S-100 and ECDIS, particularly in the presentation layer, to ensure compatibility with existing maritime systems.
- **User-Friendly Interface**: A well-designed interface will allow stakeholders to visualize and interact with the data easily, enhancing usability and effectiveness.

By implementing this IT system, OVERHEAT aims to improve operational efficiency in maritime environments. The ability to share data seamlessly among stakeholders will not only enhance situational awareness but also support informed decision-making, ultimately contributing to safer and more efficient maritime operations. This innovative approach underscores the project's commitment to leveraging technology for enhanced safety and operational excellence in the maritime sector.

3.6 KER 3 exploitation roadmap

The exploitation roadmap is below explained.

- **Customer/User Identification:** Peopletrust, in collaboration with all project partners, will conduct a comprehensive analysis of potential customers and users for the technology. Our primary target group includes shipowners and maritime industry in general.
- **Synergy and Collaboration Exploration**: Peopletrust, along with technical partners, will investigate complementary models and tools to identify opportunities for synergies, cooperation, or potential integration. This initiative aims to enhance the tool’s development and explore its research applications.
- **Market Research for Economic Sustainability**: Peopletrust, together with key technical partners, will assess market interest and evaluate the long-term sustainability of the tool within the market.
- **Funding Exploration**: All interested partners will explore funding opportunities to support the advancement of the Prototype of the IT system and prepare it for market launch.

The below table shows measurement criteria, in particular indicators, targets for KER3.

Table 5 – KER 3 Measurement Criteria

Activity	Indicator	Target

Data Integration Development	Completion of data integration system	Completed
	Number of data sources integrated	5+
API Development	Completion of API for external system access	Completed
	Number of external systems integrated	3+
User Interface Design	Completion of user-friendly display interface	Completed
	User satisfaction rating (via feedback)	80% satisfaction
Compliance with Standards	Adherence to ISO/OSI standards	100% compliance
	Number of standards implemented	2+
Testing and Validation	Number of successful tests conducted	10+
	Accuracy of data presentation	95% accuracy
Documentation and Training	Completion of comprehensive documentation	100% completed
	Number of training sessions conducted	2+

3.7 KER 4 Prototypes of the IoT sensors and of the networking elements for the vessel description

The OVERHEAT project focuses on developing a range of IoT sensors and networking elements specifically designed for vessels to enhance fire detection capabilities. These sensors will be strategically installed on the vessel itself, as well as on containers, whether permanently or temporarily, to enable early detection of fires. This is particularly crucial for monitoring containers located in lower decks or at the lowest levels of weather deck container stacking, where fire risks may go unnoticed until it is too late.

The IoT sensors will include various types such as smoke detectors, heat sensors, and environmental monitoring devices that can detect changes in temperature or smoke levels. By integrating these sensors into a cohesive network, the system will facilitate real-time data collection and transmission, ensuring that critical information is readily available to decision-makers.

In addition to the sensors, networking elements will be developed to support data communication across the vessel. This infrastructure will enable seamless connectivity between sensors and central monitoring systems, allowing for efficient data aggregation and analysis. The design and number of IoT sensors and networking components will align with the simulation and demonstration plans outlined in the project, ensuring that they meet operational requirements and performance standards.

The implementation of this advanced sensor network aims to significantly improve fire safety on vessels by providing timely alerts and actionable insights. By leveraging cutting-edge technology, OVERHEAT seeks to enhance situational awareness and response capabilities in maritime operations, ultimately contributing to safer and more efficient shipping practices.

3.8 KER4 exploitation roadmap

Fort KER4 the exploitation roadmap is presented.

- **Customer/User Identification:** Peopletrust, in collaboration with all project partners, will undertake a thorough analysis of potential customers and users for the technology. This process will involve identifying key user segments that can benefit from the system. Our primary target group includes shipowners, port authorities and maritime industry sector.
- **Synergy and Collaboration Exploration:** Peopletrust, in conjunction with OVERHEAT technical partners, will explore complementary models and tools to identify opportunities for synergies, cooperation, or potential integration. This effort aims to optimize the tool's development by leveraging existing technologies and frameworks.
- **Market Research for Economic Sustainability:** Peopletrust, together with key technical partners, will conduct a detailed market analysis to gauge interest in the tool and evaluate its long-term sustainability. This research will include assessing competitor offerings, identifying market trends, and analyzing customer feedback. The findings will help OVERHEAT project to refine our business strategy and make informed decisions about product positioning and marketing.
- **Funding Exploration:** All interested partners will actively seek out funding opportunities to support the development and market launch of Prototypes of the IoT sensors. We will explore various funding sources, including grants, and partnerships with private sector entities.

The below table shows activities, indicators, targets for KER4.

Table 6 – KER 4 Measurement Criteria

Activity	Indicator	Target
IoT Sensor Development	Completion of IoT sensor prototypes	Completed
	Number of sensor types developed	3+

Networking Elements Development	Completion of networking infrastructure	Completed
	Number of networking components developed	2+
Data Collection System Integration	Functionality of data aggregation system	Fully operational
	Accuracy of data collected	95% accuracy
Testing and Validation	Number of successful tests conducted	10+
	Response time for alerts	<5 seconds
Compliance with Simulation Plans	Alignment with simulation and demo requirements	100% compliance
	Number of simulations successfully completed	2+
Documentation and Training	Completion of comprehensive documentation	100% completed
	Number of training sessions conducted	2+

3.9 KER 5 Digital solution and simulation

The OVERHEAT project focuses on the development of advanced digital solutions and simulation capabilities tailored for maritime operations, specifically addressing the needs of ports, vessels, and collaborative data-sharing among surveillance and rescue teams. This initiative aims to enhance safety, efficiency, and coordination in fire prevention and management scenarios.

The project will begin by designing intelligent digital solutions for safer vessel management. These solutions will integrate fire prevention, detection, and management systems into existing ship data infrastructures, particularly utilizing the Electronic Chart Display and Information System (ECDIS) as a central hub for data integration. The design process will carefully consider the characteristics of data produced by various sensors involved in fire management, ensuring that the right information is delivered at the right time with minimal access delays. This local area network will facilitate effective communication between sensors and user interfaces, enhancing situational awareness onboard.

On the port side, the digital solution will channel data from a wide array of sensors deployed both on land and at sea. This includes monitoring met-ocean conditions (such as wind, waves, and

currents), hydrographic data (like tides and water levels), and traffic conditions (via AIS). The system will create a comprehensive data flow that supports various stakeholders, including harbor masters and firefighting teams, by providing tailored information relevant to their specific operational needs.

To ensure effective integration between port and vessel systems, a collaborative platform will be developed. This platform will allow for real-time sharing of situational data between vessels in distress and rescue teams on land. By interconnecting the data clouds from both environments, stakeholders can maintain a unified view of ongoing operations during rescue missions.

Simulation tools will play a crucial role throughout this process. They will be used to model external environments realistically for each module, allowing for thorough testing and validation before deployment. By simulating different scenarios, the project can optimize data flows and ensure that all components function seamlessly together.

Ultimately, the digital solutions developed within this framework aim to provide a robust infrastructure for maritime operations that enhances safety, improves response times in emergencies, and fosters collaboration among various maritime stakeholders. Through innovative technology integration and effective simulation practices, OVERHEAT seeks to set new standards in maritime safety management.

3.10 KER 5 exploitation roadmap

Given the innovation of the Digital solution tool, the exploitation roadmap is below presented.

Customer Identification will be performed thanks to:

- Target Market Analysis**:** Identify and profile key customer segments, including ports, vessel operators, harbor masters, and emergency response teams. Utilize surveys and interviews to gather insights on their specific needs related to fire prevention and management.
- Stakeholder Engagement**:** Establish partnerships with relevant stakeholders (so exploiting SSB members and project cluster) in the maritime sector to better understand their operational challenges and how the OVERHEAT solutions can address them. This will include discussions with regulatory bodies, industry associations, and potential end-users.

Synergy and Collaboration Exploration will rely on:

- Identification of possible Complementary Technologies**:** Conduct a thorough analysis of existing technologies and systems used in maritime operations to identify potential integration opportunities. This includes ECDIS systems, fire detection equipment, and other relevant data-sharing platforms.
- Partnership Development**:** Collaborate with technology providers, research institutions, and industry organizations (so exploiting the project SSB) to explore joint development initiatives that can enhance the functionality of the OVERHEAT solutions.

- Collaborative Platform Design**:** Design a collaborative platform that facilitates real-time data sharing between vessels and shore-based emergency response teams, ensuring seamless communication during incidents. Focus on interconnecting data clouds for a unified operational view.

Market Research for Economic Sustainability will be based on:

- Market Trends Analysis**:** Investigate current trends in maritime safety technology and fire management systems. This will involve analyzing competitor offerings and customer feedback to understand market demands and gaps.
- Economic Viability Study**:** Conduct a feasibility study to evaluate the long-term economic sustainability of the OVERHEAT DS.
- Regulatory Environment Assessment**:** Examine the regulatory landscape affecting maritime operations and fire safety to ensure compliance and identify any potential market barriers or opportunities.

Funding Exploration will be constituted of:

- Identification of Funding Opportunities**:** Research various funding sources, including grants from maritime safety organizations, governmental funding programs, and private investment options. Develop a comprehensive list of potential funding avenues.
- Grant Proposal Development**:** Prepare detailed proposals for identified funding opportunities that clearly outline the OVERHEAT project's objectives, anticipated impacts, and budgetary requirements.

Measurement criteria, including activities, indicators targets for KER5 are presented in the below table.

Table 7 – KER 5 Measurement Criteria

Activity	Indicator	Target
Digital Solution Development (Vessels)	Completion of intelligent digital solutions	Completed
	Number of features integrated	5+
Digital Solution Development (Ports)	Completion of port management systems	Completed
	Number of data sources integrated	8+
Collaborative Platform Integration	Functionality of the data sharing platform	Fully operational

	Number of stakeholders connected	5+
Simulation Model Development	Completion of simulation models	3+
	Number of scenarios tested	5+
Testing and Validation	Number of successful tests conducted	10+
	Accuracy of simulation results	95% accuracy
Documentation and Training	Completion of comprehensive documentation	100% completed
	Number of training sessions conducted	2+

CONCLUSIONS

The OVERHEAT preliminary exploitation plan outlines a strategic approach to ensure the successful deployment and sustainability of the project's outcomes. By focusing on the integration of innovative technologies for fire detection and management in maritime environments, the project aims to enhance safety and operational efficiency in ports and shipping operations.

Central to this plan is the commitment to open access and knowledge sharing among stakeholders. The project will facilitate collaboration through workshops, conferences, and publications, ensuring that findings are disseminated widely within the scientific community and industry. This engagement not only promotes transparency but also fosters a culture of continuous improvement and innovation.

The exploitation strategy prioritizes the development of user-friendly systems, such as the Traffic Flow Tracking and Display System, which will provide real-time data integration from various sources, including drones and IoT sensors. This system is designed to support decision-making processes, thereby enhancing operational effectiveness in busy harbor environments.

Furthermore, the plan emphasizes the importance of stakeholder engagement throughout the project lifecycle. By identifying key stakeholders early on and maintaining open lines of communication, OVERHEAT aims to align its objectives with the needs of end-users, ensuring that the solutions developed are practical and relevant.

In conclusion, the OVERHEAT preliminary exploitation plan is a comprehensive framework that not only addresses immediate project goals but also lays the groundwork for long-term sustainability and impact. Through strategic stakeholder engagement, innovative technology deployment, and a commitment to open access, OVERHEAT is poised to make significant contributions to maritime safety and environmental management. The success of this plan will ultimately depend on ongoing collaboration and adaptability in response to emerging challenges in the maritime sector.

REFERENCES

1. OVERHEAT (2024). Project GRANT AGREEMENT NUMBER 101076633.
2. OVERHEAT (2024) D 9.1 OVERHEAT PDP.
3. European Commission: Directorate-General for Research and Innovation, Dissemination and exploitation strategy for Horizon Europe – Towards an integrated dissemination & exploitation ecosystem, Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2777/650016.
4. European Commission: European Innovation Council and SMEs Executive Agency, Scherer, J., Weber, S., Alveen, P., Sweeney, E. et al., European IP Helpdesk – Successful valorisation of knowledge and research results in Horizon Europe – Boosting the impact of your project through effective communication, dissemination and exploitation, Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2826/437645.

Funded by
the European Union

This project has received funding from the European Union's Horizon Europe research and innovation programme under Grant Agreement Project No: 101076633. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.