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AUTOFLEX

[D1.1] PROJECT MANAGEMENT PLAN (PMP)

Work Package	WP1	Project Administration & Dissemination
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DELIVERABLE INFORMATION

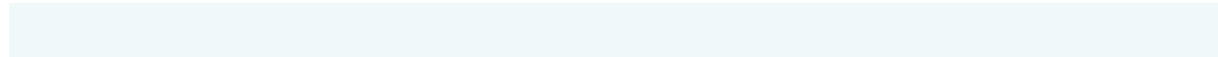
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EXECUTIVE SUMMARY

This Project Management Plan (PMP) serves as a guiding document for achieving AUTOFLEX's ambitious goals, ensuring compliance, collaboration, and impact. This is the first deliverable in Work Package 1 Project Administration and Dissemination, Task 1.1 Project administrative and financial coordination.

AUTOFLEX is structured along six work packages (WPs), each addressing critical research and development objectives. These work packages comprise of tasks and deliverables, and a specific chapter on work breakdown structure (WBS) is included.

The AUTOFLEX schedule and list of important milestones are included and presented as a Gantt chart and with textual presentation of initially identified critical paths leading up to the major milestones at the end of the project.

The PMP also defines the governance (structure) and decision-making processes in the project, as well as how the project will be monitored and evaluated. A communication plan is also included.

The Project Management Platform is described in detail and in AUTOFLEX this is Microsoft Teams/SharePoint.

Other important project management tasks, such as risk management and quality assurance, data management and exploitation and innovation management are covered by separate deliverables in Work Package 1.

The PMP is the initial plan for the project and is linking to several other deliverables. Project Management is a continuous process and the content of this deliverable will be followed-up and updated accordingly throughout the whole project's duration.

TABLE OF CONTENTS

Deliverable Information	ii
Executive Summary	iii
Table of Contents	iv
Table of Figures	vi
Table of Tables	vii
List of Abbreviations	viii
1 Introduction	1
1.1 Document purpose	1
2 Project Overview	2
2.1 Project summary	2
2.2 Work breakdown structure (WBS)	2
2.2.1 Work packages	2
2.2.2 WP1: Project administration and dissemination	3
2.2.3 WP2: From modal shift barriers to design parameter quantification	4
2.2.4 WP3: Developing automated multimodal zero-emission transport systems	4
2.2.5 WP4: Developing small automated zero-emission vessels	5
2.2.6 WP5: Realising the modal shift by sustainable business models and impact evaluations	6
2.2.7 WP6: Demonstration and validation	7
2.2.8 List of deliverables	8
2.3 Consortium	9
3 Governance and Decision-Making	11
3.1 Management structure	11
3.2 Decision-making processes	12
4 Communication Plan	14
4.1 Communication with cinea	14
4.2 Internal communication through e-mails	14
4.3 Internal communication through the Project Management Platform	14
5 Schedule and Milestones	16

5.1	Project Gantt	16
5.2	List of milestones	16
5.3	Critical path	17
6	Risk Management and Quality Assurance	20
7	Data Management	21
8	Exploitation and Innovation Management	22
9	Monitoring and evaluation	23
9.1.1.	Interim monitoring reports	23
9.1.2.	Periodic reports	23
9.1.3.	Final report	25
10	Project Management Platform	26



TABLE OF FIGURES

Figure 2-1: The AUTOFLEX Work Package structure. _____ 3
Figure 3-1: AUTOFLEX Management Structure. _____ 12
Figure 3-2: Escalation of conflict resolution. _____ 13
Figure 5-1: AUTOFLEX Gantt with Work Packages and main tasks. _____ 16
Figure 10-1: Microsoft Teams for AUTOFLEX. _____ 26

TABLE OF TABLES

Table 2-1: AUTOFLEX Work Package overview. _____ 2

Table 2-2: WP1 tasks. _____ 3

Table 2-3: WP2 tasks. _____ 4

Table 2-4: WP3 tasks. _____ 5

Table 2-5: WP4 tasks. _____ 6

Table 2-6: WP5 tasks. _____ 7

Table 2-7: WP6 tasks. _____ 7

Table 2-8: AUTOFLEX deliverables sorted by Work Package. _____ 8

Table 2-9: List of AUTOFLEX partners. _____ 9

Table 5-1: AUTOFLEX milestones sorted by milestone number. _____ 16

LIST OF ABBREVIATIONS

Abbreviation	Description
AAB	AUTOFLEX Advisory Board
CA	Consortium Agreement
DFDS	Det Forenede Dampskibs- Selskab
DST	Development Centre for Ship Technology and Transport Systems
EC	The European Commission
FHG	Fraunhofer CML
GA	Grant Agreement
ICT	Information and Communication Technology
IPR	Intellectual Property Rights
ISE	Institut für Strukturleichtbau und Energieeffizienz
IWT	Inland Waterway Transport
KET	Key Enabling Technology
MR	Maritime Robotics
NSP	North Sea Port
NTUA	National Technical University of Athens
PM	Person Month
PMP	Project Management Plan
SO	SINTEF Ocean
SOTA	State-of-the-Art
TCO	Total Cost of Ownership
WP	Work Package
ZEM	Zero Emission
ZES	Zero Emission Services

1 INTRODUCTION

This deliverable relates to task 1.1 in the project, provides a Project Management Plan and outlines the strategies and processes implemented to ensure successful execution, monitoring, and completion of the AUTOFLEX project. The AUTOFLEX project is funded by the European Union's Horizon Europe program under grant agreement number 101136257. The project officially commenced on January 1st, 2024, and has a planned duration of 36 months.

1.1 DOCUMENT PURPOSE

The purpose of this PMP is to establish a common framework for the management of the AUTOFLEX project. It serves as a reference document for the consortium, governing project coordination, execution, and decision-making processes. This PMP aims to ensure:

- Efficient and timely completion of project deliverables
- Optimal use of resources
- Adherence to Horizon Europe guidelines and regulations
- High-quality research outputs
- Effective communication and collaboration among partners

2 PROJECT OVERVIEW

2.1 PROJECT SUMMARY

AUTOFLEX is an EU-funded research project facilitating the transition to climate-friendly, flexible, and resilient transport. New autonomous inland cargo vessels are being developed that can reliably carry out transport services in small waterways, even in confined waters and in extreme-low water situations. New distribution hubs are designed as an interface to road transport, which will ensure both cargo transshipment and zero-emission energy supply for the ships and trucks at the same time. Two use cases are situated in the Randstad Holland region between Rotterdam and Amsterdam, and in the East Flemish city of Ghent. The use cases will be utilised to validate the ship concepts, establish a roadmap for exploitation, make recommendations to policy and industry, and propose interface standards.

2.2 WORK BREAKDOWN STRUCTURE (WBS)

2.2.1. WORK PACKAGES

The project is organized in six work packages, as outlined in Table 2-1. The work package structure is as follows: WP1 covers project administration and coordination, dissemination, and exploitation. WP2 deals with the requirements and design conditions mapping for building blocks, WP3 and WP4 deal with the development of the AUTOFLEX building blocks, while WP5 and WP6 deal with the evaluation and validation of the AUTOFLEX building blocks, as shown in Figure 2-1.

Table 2-1: AUTOFLEX Work Package overview.

WP #	WP Title	Lead beneficiary	Person months	Start month	End month
WP1	Project Administration & dissemination	SO	44	1	36
WP2	From modal shift barriers to design parameter quantification	FHG	40	2	18
WP3	Developing automated multimodal zero-emission Transport Systems	SO	62	6	28
WP4	Developing small automated Zero-emission Vessels	DST	98	2	30
WP5	Realising the modal shift (business models, impacts, standards, and recommendations)	DFDS	51	12	34
WP6	Demonstration and validation	MR	60	18	36

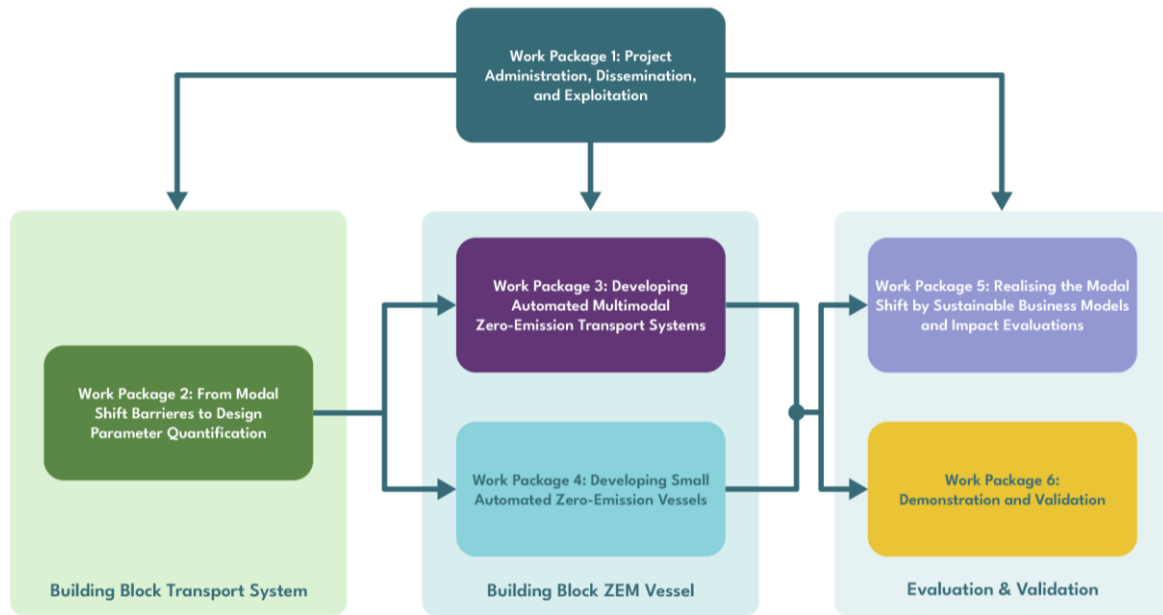


Figure 2-1: The AUTOFLEX Work Package structure.

2.2.2. WP1: PROJECT ADMINISTRATION AND DISSEMINATION

Objectives:

- Monitor and control progress according to plan (administrative, technical, and financial perspectives)
- Monitor and control the technical developments of AUTOFLEX and ensure that the progress is in line with the project objectives
- Teambuilding and facilitation of efficient collaboration between the Consortium members to ensure joint efforts towards achieving the project objectives
- Ensure continuous communication and information flow towards the EC, AAB, and other stakeholders outside the Consortium
- Quality assurance of project work and deliverables to ensure that the work and results adheres to high quality standards and are in line with the expected results
- Efficiently monitoring and control project risks by frequent risk evaluation and mitigating actions
- Widespread dissemination of project results through public, industry, and academic channels.
- Efficient exploitation of project results to ensure the realisation of expected societal and industry benefits through active dissemination, knowledge and IPR management strategy.

The WP1 tasks are listed in Table 2-2.

Table 2-2: WP1 tasks.

Task #	WP Title	Lead beneficiary	Participants	Start month	End month
T1.1	Project Administration & financial coordination	SO	All	1	36

T1.2	Quality and risk management	NTUA	All	1	36
T1.3	Dissemination and exploitation management	FHG	All	1	36
T1.4	Advisory board and stakeholder engagement	FHG	All	31	36
T1.5	Ethics and data management	SO	All	1	36

2.2.3. WP2: FROM MODAL SHIFT BARRIERS TO DESIGN PARAMETER QUANTIFICATION

Objectives:

- Quantify design parameters and boundary conditions for vessel design, and for the transport system
- Define requirements and performance targets to overcome modal shift barriers
- Analyse transport market and identify KPIs to evaluate the AUTOFLEX transport system
- Model and simulate the new AUTOFLEX transport system based on real-world logistic data
- Conduct interviews among selected stakeholders to derive mode selection criteria
- Build a foundation for novel business models
- Further develop SO tool to facilitate logistical analysis

WP2 tasks are listed in Table 2-3.

Table 2-3: WP2 tasks.

Task #	WP Title	Lead beneficiary	Participants	Start month	End month
T2.1	Quantify design parameters and boundary conditions	DST	FHG, ISE, DFDS	2	12
T2.2	Transport demand modelling (market analysis)	FHG	DFDS, SO	2	12
T2.3	Existing transport systems and services	DFDS	FHG, DST, NTUA	2	12
T2.4	Simulation model for logistical analysis	SO	FHG, NTUA, ISE, MR, DST	6	18

2.2.4. WP3: DEVELOPING AUTOMATED MULTIMODAL ZERO-EMISSION TRANSPORT SYSTEMS

Objectives:

- Develop the missing components for realising efficient zero-emission transport systems
- Develop a zero-emission transport system where truck transport for urban distribution is minimal

- Generate operational profile for the vessel designs by identifying representative transport tasks on small waterways
- Conceptualise energy and cargo hubs for zero-emission transport systems
- Investigate the feasibility of temporary port terminals for cargo transfer
- Introduce Mobile Distribution Centres as addition to the existing transport supply chain
- Re-design the transport system architecture and implement the AUTOFLEX system
- Validate the performance, liability, safety, security and resilience of the AUTOFLEX system
- Investigate methods for energy supply from renewable sources

WP3 tasks are listed in Table 2-4.

Table 2-4: WP3 tasks.

Task #	WP Title	Lead beneficiary	Participants	Start month	End month
T3.1	Combined energy and cargo hubs (Stow&Charge)	DFDS	ZES, ISE	6	20
T3.2	Temporary port terminals	DFDS	ISE, DST, SO	6	20
T3.3	Mobile Distribution Centres	DST	ISE, SO, DFDS	6	20
T3.4	Transport system architecture re-design	SO	DST, DFDS, NTUA, FHG	12	28
T3.5	Transport system performance validation	SO	DST, DFDS	18	28
T3.6	Safety, security, and resilience of transport systems	NTUA	FHG	18	28

2.2.5. WP4: DEVELOPING SMALL AUTOMATED ZERO-EMISSION VESSELS

Objectives:

- Develop KETs (situational awareness, navigation, and control algorithms) for uncrewed inland vessels
- Hydrodynamic optimisation of vessel power demand and manoeuvrability
- Structural design and evaluation of potentials through lightweight materials and construction methods
- Create a model for estimating Total Cost of Ownership (TCO) for the vessel concept
- Develop catalogue with in-situ and simulation-based validation/test cases for automated ship operations
- Create KPI toolbox containing applicable methods/techniques to test/validate the system performance
- Safety monitoring tool for automated vessel operations with validated KPIs and methods
- Definition of autonomous ship mission
- Remote Control Centre method for distributing missions to a fleet
- Apply safety and security measures for autonomous inland navigation

WP4 tasks are listed in Table 2-5.

Table 2-5: WP4 tasks.

Task #	WP Title	Lead beneficiary	Participants	Start month	End month
T4.1	Impacts of automation and zero-emission on inland vessel design	DST	SO,ISE	2	6
T4.2	Uncrewed vessel concept development	ISE	SO, DST	6	16
T4.3	Basic design and optimisation of hull and propulsion	DST	SO, ISE	12	24
T4.4	Manoeuvring model for control algorithm	SO	DST, MR	18	26
T4.5	Inland vessel automation and autonomy	MR	DFDS, DST	3	30
T4.6	Remote control centre concept	MR	SO, FHG	6	30
T4.7	Safety, security and resilience of automated fleets – The SeaGuard tool	NTUA	FHG, MR, SO	6	30

2.2.6. WP5: REALISING THE MODAL SHIFT BY SUSTAINABLE BUSINESS MODELS AND IMPACT EVALUATIONS

Objectives:

- Develop and validate business models to provide the services that are required to realise the AUTOFLEX system.
- Show improved performance in terms of logistical, environmental, and commercial KPIs.
- Demonstrate viability of operating the novel transport system without extensive changes in existing logistic management and ICT systems.
- Quantify impact on competitiveness and modal shift compared to SOTA transport market from WP2
- Assessment of applicability of the AUTOFLEX concept to increase the resilience of IWT in larger waterways in low-water conditions.
- Publish a White Paper and provide recommendations to policy and investment decision makers (enabler E3: KET interface Standard)
- Interface standards including relevant data protocols, data formats, and hardware interfaces for autonomous inland navigation

WP5 tasks are listed in Table 2-6.

Table 2-6: WP5 tasks.

Task #	WP Title	Lead beneficiary	Participants	Start month	End month
T5.1	Enabling business models	DFDS	All	12	30
T5.2	Accelerating uptake of autonomy by technical standardisation	SO	FHG, MR, DFDS	18	30
T5.3	Validating the AUTOFLEX business model	DFDS	SO, FHG	20	32
T5.4	Transferability of the vessel concept	DST	DFDS, SO, FHG	24	32
T5.5	Impact quantification	SO	FHG	24	34
T5.6	Increasing the waterborne modal share - recommendations to policy and investment decision makers	FHG	All	24	34

2.2.7. WP6: DEMONSTRATION AND VALIDATION

Objectives:

- Verification of power demand and manoeuvrability of the small uncrewed vessels by scale model and simulations
- Verification of automatic navigation in scale model test and VeLABi
- Planning, risk and safety analysis, and approval, for full scale demonstration
- Verification of automatic navigation in full-scale demonstration

WP6 tasks are listed in Table 2-7.

Table 2-7: WP6 tasks.

Task #	WP Title	Lead beneficiary	Participants	Start month	End month
T6.1	Obtain permits and approval	DFDS	MR, NTUA, FHG, SO, NSP	18	30
T6.2	Detailed planning and preparation	MR	DFDS, FHG, NTUA, SO, NSP	18	30
T6.3	Hardware-In-the-Loop testing - SeaControl	DST	MR, NTUA, SO	20	30
T6.4	Scale model testing and hydrodynamic analysis	DST	SO, ISE	22	32

T6.5	Full scale demonstration and validation of autonomous inland navigation	MR	DFDS, NSP, FHG	30	36
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2.2.8. LIST OF DELIVERABLES

The list of deliverables is given in Table 2-9Table 2-8. Note that the first index of the deliverable number corresponds to the WP which it relates to.

Table 2-8: AUTOFLEX deliverables sorted by Work Package.

Del. #	Deliverable name	WP	Lead	DL	Delivery month	Review partner
D1.1	Project Management Plan	1	SO	PU	M03	NTUA
D1.2	Data Management Plan Initial Revision	1	SO	PU	M03	NTUA
D1.3	Quality and Risk Management Plan	1	NTUA	PU	M03	SO
D1.4	Project branding	1	FHG	PU	M03	DFDS
D1.5	Knowledge and IPR plan	1	SO	SEN	M06	MR
D1.6	D&C Plan and Reporting Initial Revision	1	FHG	PU	M06	DST
D1.7	D&C Plan and Reporting Intermediate Revision	1	FHG	PU	M18	SO
D1.8	Data Management Plan Intermediate Revision	1	SO	PU	M18	DFDS
D1.9	Exploitation Roadmap	1	FHG	PU	M34	DFDS
D1.10	D&C Plan and Reporting Final Revision	1	FHG	PU	M36	SO
D1.11	Data Management Plan Final Revision	1	SO	PU	M36	DST
D2.1	Design Basis	2	DST	PU	M12	SO
D2.2	Market Analysis	2	FHG	PU	M12	ISE
D3.1	Transport Concepts	3	DFDS	PU	M20	FHG
D3.2	Transport system	3	SO	PU	M28	MR
D3.3	Safe, Secure, and Resilient Transport	3	NTUA	PU	M28	SO
D4.1	Design Impacts	4	DST	PU	M12	NTUA
D4.2	Uncrewed Vessel Concept	4	ISE	PU	M16	MR
D4.3	Uncrewed Vessel Basic Design	4	DST	SEN	M24	FHG

D4.4	Manoeuvring Model	4	SO	SEN	M30	FHG
D4.5	IWW Autonomy Package	4	MR	PU	M30	ISE
D4.6	Safety State Tool (SeaGuard)	4	NTUA	SEN	M30	DST
D5.1	Interface Standard	5	SO	PU	M30	DST
D5.2	Business Models	5	DFDS	PU	M32	SO
D5.3	Transferability	5	DST	PU	M32	ISE
D5.4	Modal Shift Potentials and Barriers - Impacts	5	SO	PU	M34	DFDS
D5.5	Steps to Realisation	5	FHG	PU	M34	MR
D6.1	SIL & HIL Test	6	DST	PU	M30	FHG
D6.2	Demonstration Plan	6	MR	SEN	M30	DST
D6.3	Validation of Manoeuverability	6	DST	PU	M32	MR
D6.4	Full Scale Demonstration	6	MR	PU	M36	FHG

2.3 CONSORTIUM

The parties to the AUTOFLEX Consortium are listed in Table 2-9 below. The Consortium consists of eight beneficiaries, and one Associated Partner.

Table 2-9: List of AUTOFLEX partners.

Partners #	Partner name	Short name	Role
1	SINTEF Ocean	SO	Leading Project Management and ethics activities, Work Package Leader WP3 on transport system building blocks
2	DFDS	DFDS	Work Package Leader WP5 on business models and cost benefit analysis, key partner on full scale demonstration through own vessel
3	Ethnicon Metsovion Polytechnion	NTUA	Leading Risk and Quality activities, leading safety, security and resilience tasks both in WP3 and WP4.
4	Institut für Strukturleichtbau und Energieeffizienz	ISE	Task Leader on vessel concept development
5	Maritime Robotics	MR	Work Package Leader WP6 on demonstration and validation, key enabling partner for autonomous KET development and full-scale demonstration

6	Fraunhofer Gesellschaft zur Förderung der Angewandten Forschung	FHG	Leading dissemination and exploitation activities, Work Package Leader WP2 on transport system modelling
7	Entwicklungszentrum für Schiffstechnik und Transportsysteme	DST	Work Package Leader WP4 on vessel concept, key enabling partner on scale model tests and demonstrations in VeLABi
8	Zero Emission Services	ZES	Key enabling partner on zero emission solutions including Stow&Charge
9*	North Sea Port Flanders*	NSP	Associated Partner supporting the full-scale demonstration in WP6

* North Sea Port Flanders is an Associated Partner, i.e., they are not a Beneficiary, however they are a party to the AUTOFLEX Consortium Agreement.

3 GOVERNANCE AND DECISION-MAKING

3.1 MANAGEMENT STRUCTURE

The AUTOFLEX governance structure is regulated by the AUTOFLEX Consortium Agreement version 1.1 (the CA), which has been signed by all parties in the Consortium listed in Table 2-9.

The detailed definition of the responsibilities of the consortium bodies, as well as decision making, is regulated by the CA. Decisions, as defined in the CA, are made by the Project Board.

The CA defines the organisational structure as comprised of the following Consortium Bodies:

- The Project Board as the ultimate decision-making body of the Consortium. It consists of all parties to the Consortium with one representative per party.
- The Executive Board as the supervisory body for the execution of the Project, which shall report to and be accountable to the Project Board will consist of the Coordinator, the Dissemination and Exploitation Manager, the Risk and Quality Manager, The Ethics Manager, and the Work Package Leaders.
- The Coordinator as the legal entity acting as the intermediary between the Parties to the Consortium and the Granting Authority. The Coordinator shall, in addition to its responsibilities as a Party, perform the tasks assigned to it as described in the Grant Agreement and the CA.
- The Work Package Leaders will consist of representatives of the lead participant for each Work package.

The management structure is given in Figure 3-1. AUTOFLEX also has an advisory board consisting of organizations external to the CA parties. The advisory board members will be consulted for advice and input to the research by workshops and interviews, however, they do not have any direct involvement in decision making.

Work Package Leaders will monitor the progress and realisation of deliverables and milestones for the respective work package, by setting internal deadlines. Additionally, the work package leaders will oversee the technical progress of the Work packages and ensures interoperability and alignment of co-dependent tasks across work packages.

The Coordinator is the intermediary between the Parties in the CA and the Granting Authority, and performs the tasks assigned and described in the Grant Agreement and the CA. The Coordinator is responsible for monitoring the compliance by the CA Parties to their obligations under the CA and the Grant Agreement. The responsibilities of the Project Coordinator include:

- Continuous monitoring of the overall project progress according to task, deliverable, and milestone deadlines (presented in chapter 5).

- Keeping updated contact list for Parties and other relevant contact persons (e.g., the advisory board).
- Collecting, final review of, and submittal of deliverables to the Granting Authority.
- Administering the financial contribution of the Granting Authority and fulfilling the financial tasks described in the CA.

The **Executive Board** shall prepare the meetings, propose decisions and prepare the agenda of the Project Board. The executive board is also responsible for the proper execution and implementation of the decisions of the Project Board. The project board shall monitor the effective and efficient implementation of the Project. The Executive board shall collect information of the progress of the Project every 6 months, assess the compliance of the Project with the Consortium Plan and, if necessary, propose modifications of the project plan to the Project Board. The Executive Board shall support the Coordinator in the preparation of meetings with the Granting Authority and in preparing data and deliverables. Prepare the content and timing of press releases and joint publications by the consortium or proposed by the Granting Authority.

The **Project Board** is responsible for making decisions, as defined in the CA. They are free to act on its own initiative to formulate proposals and take decisions. In addition, all proposals made by the Executive Board shall also be considered and decided upon by the Project Board.

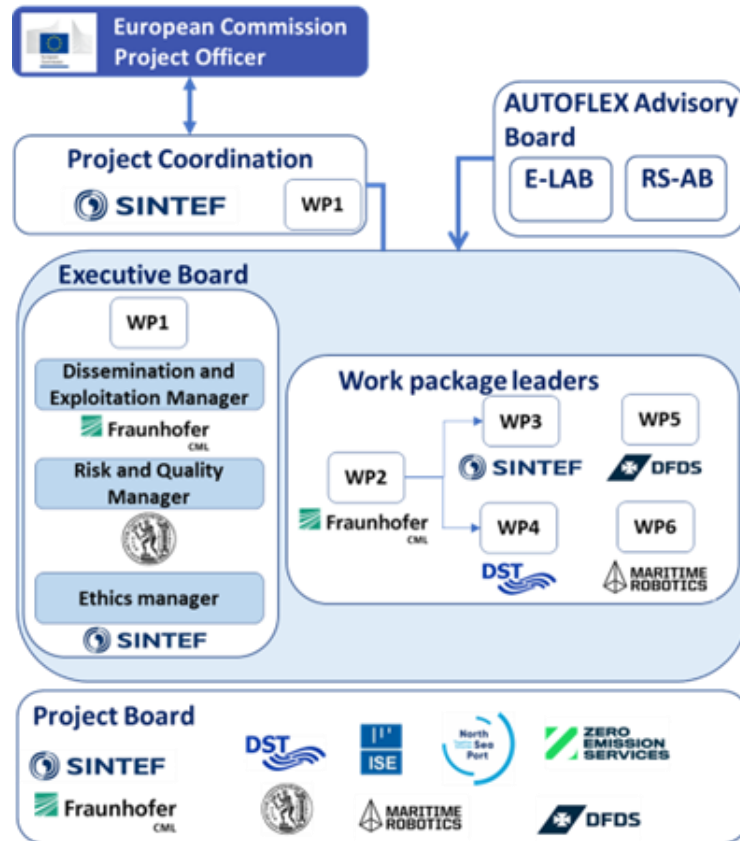


Figure 3-1: AUTOFLEX Management Structure.

3.2 DECISION-MAKING PROCESSES

The Project Board is the decision-making body of the consortium. Decisions will normally be taken by the responsible team members and organisation bodies, based on the description of work to be performed, as stated in the Consortium Agreement and the Description of Action (DoA), as communicated regularly, and as defined in the individual Work Package or Task descriptions. In case there is a dispute between two or more team members, an escalation

procedure shall be followed. In the course of the project the consortium will have to agree on and develop technical, scientific and commercial ideas and specifications. An Agreement will be reached first by informal contact, followed by official confirmation via electronic mail or letter. In the course of the project the consortium will have to agree on and develop technical, scientific and commercial ideas and specifications. Agreement will be reached first by informal contact, followed by official confirmation through electronic mail, letter or agreed written minutes. For important issues, the agreement may take the form of a short report that needs to be signed by those responsible for decision-making. Non-technical factors such as resource allocation and contractual terms will also need to be agreed and documented. Technical issues/conflicts within given contractual commitments that do not involve a change of contract, a change of budget and/or a change of resources will be solved on a WP level first. If the decision being taken is unacceptable to partners found in the minority positions, the resolution of the conflict will be escalated according to the path as specified in Figure Figure 3-2.

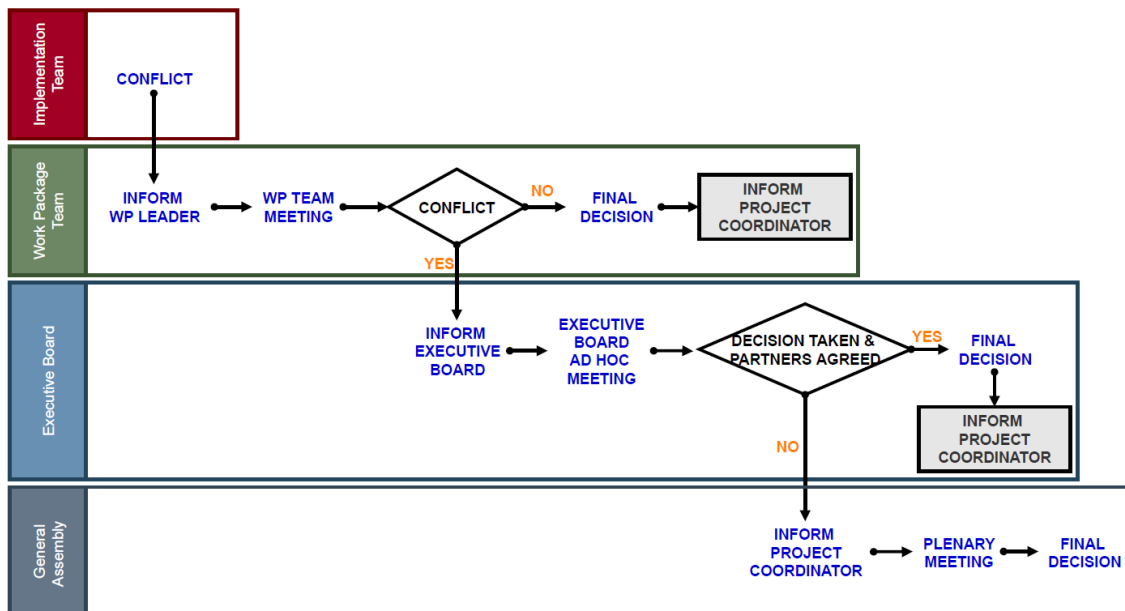


Figure 3-2: Escalation of conflict resolution.

4 COMMUNICATION PLAN

External communication and dissemination are addressed by the three periodic D&C Plan and reporting deliverables D1.6, D1.7 and D1.10.

Proper communication in a project is a critical success factor, and the communication within the AUTOFLEX project will mainly take the form of:

- Information sharing and storage on the AUTOFLEX Project Management Platform
- E-mails via mailing lists which are regularly updated and available on the PMP
- Microsoft Teams meetings
- Physical meetings
- Phone calls and/or SMS/WhatsApp

It is recommended that all e-mails related to the project includes the prefix “[AUTOFLEX]” to easily identify that the specific e-mail concerns AUTOFLEX.

4.1 COMMUNICATION WITH CINEA

Communication with CINEA (the European Commission) under the Agreement (information, requests, submissions, formal notifications, etc.) must be made in writing and always bear the number of the Agreement (101136257). E-mails should include the prefix “[101136257 AUTOFLEX]”.

The communication with the Project Officer is to be done by the Project Coordinator via e-mails, phone calls, or through the Participant Portal electronic exchange system and using the forms and templates provided there. Any communication from the partners with the EC shall pass through the Project Coordinator, meaning no direct communication between the partners and the EC for inquiries regarding the AUTOFLEX project.

4.2 INTERNAL COMMUNICATION THROUGH E-MAILS

To allow an effective communication among participants in the project, a mailing list will be prepared. The contacts to be included in this list shall be continuously updated by the Project Coordinator, after receiving requests for updates by the project beneficiaries.

A first version of a detailed and updated list of contacts (in Excel format) is available on the PMP.

4.3 INTERNAL COMMUNICATION THROUGH THE PROJECT MANAGEMENT PLATFORM

Communication within the consortium can be done in different ways in the PMP:

1. By using the channel e-mails
2. By posting on the channel feed
3. By using the chat, which can be used one-to-one or as a group chat

If specific persons should have special attention, these can be tagged in the post by writing “@” and then choose the contact’s name(s) from the proposed list of names popup.



5 SCHEDULE AND MILESTONES

5.1 PROJECT GANTT

The project Gantt diagram is given in Figure 5-1, which reflects the project structure. The evaluation and validation in WP 5 and 6 builds on the development in WP 3 and 4, which build on the mapping and data acquisition activities in WP2.

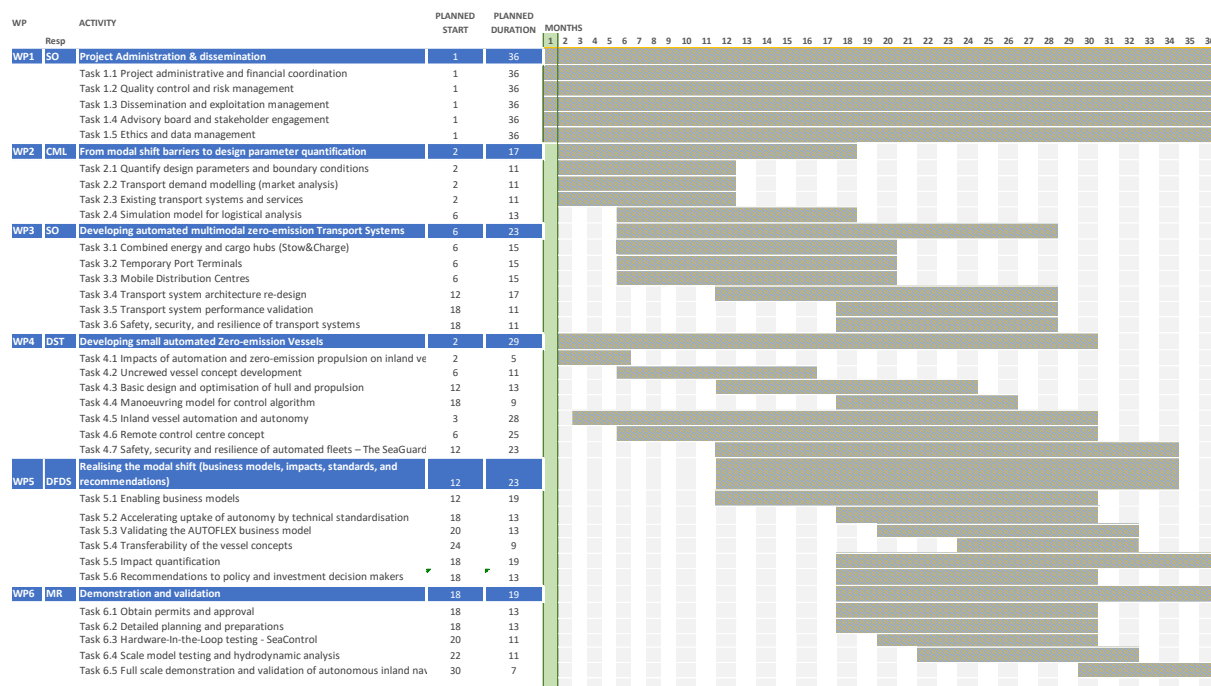


Figure 5-1: AUTOFLEX Gantt with Work Packages and main tasks.

5.2 LIST OF MILESTONES

The list of milestones is given in Table 5-1. The AUTOFLEX milestones are intended to mark the end of key activities and transitions into the next.

Table 5-1: AUTOFLEX milestones sorted by milestone number.

Milestone #	Milestone title	WP	Lead	Due month
1	Project started: Planning and branding	1	SO	3
2	Sensors for SeaSight installed	4	MR	6
3	Design basis final	2	DST	12
4	Vessel concept defined	4	ISE	16
5	Autonomy control loop closed	4	MR	18

6	Transport system components conceptualised	3	DFDS	20
7	Hull and propulsion basic design and optimisation	4	DST	24
8	Transport system performance validated	3	SO	28
9	Ready for demonstration	6	MR	30
10	AUTOFLEX ZEM uncrewed vessel validated	5,6	DST	32
11	Impacts quantified, recommendations and standard proposed	5,1	SO	34
12	Full scale demonstration and final event	6	SO	36

5.3 CRITICAL PATH

There are three critical milestones for which it is crucial to identify and monitor the critical paths, to meet the overall project deadline. These are the concluding activities marked by milestones 12 *Full scale demonstration*, 11 *Impacts quantified, recommendation and standard proposed*, and 10 *AUTOFLEX ZEM uncrewed vessel validated*.

Milestone 12 Full scale demonstration:

This milestone marks the conclusion of the full-scale demonstration where the technology for autonomous inland navigation has been developed, tested, validated and demonstrated. There are several activities that need to be completed before the full-scale demonstration can commence, and some of these depend on preceding activities. This leads to the following critical paths and dependencies:

- **T2.1 -> T 4.4 -> T4.5 -> T6.3 -> T6.5:** The design parameters and boundary conditions (T2.1) are needed before the maneuvering model (T4.4) and the navigation algorithm can be completed (T4.5). However, both tasks can start before the completion of T2.1. Similarly, the navigation algorithm needs the demonstration vessel maneuvering model before it can be completed, but most of the work in T4.5 can be done before T4.4 completes. The HIL testing in T6.3 is a validation activity of the navigation algorithm and maneuvering model developed in T4.4 and T4.5. Planning, simulator and laboratory setup can start before T4.4 and T4.5 are completed. The HIL testing might lead to a need for changes in the navigation algorithm and re-testing, which means that T4.5 depends on T6.3 to complete. Finally, the full-scale demonstration depends on T6.3 completion.
- **MS1 -> T4.5 -> T6.5:** Milestone 1 is sensors installed on the DFDS vessel to record data for training of situational awareness algorithms. The activity related to MS1 is part of T4.5 but is highlighted as it is critical to allow for the progress of the part of T4.5 related to development of situational awareness. While this part of T4.5 does not feed into the HIL testing in T6.3, it must be completed before the demonstration in T6.5

- **T4.6, T4.7, T6.1, T6.2 -> T6.5:** In addition to the above, the ROC, the safety evaluation, and the permits and approvals, and the planning must be completed before the demonstration in T6.5. These tasks do however not have preceding dependencies.

Milestone 11 Impacts quantified, recommendations and standard proposed:

This milestone marks the completion of the impact assessment, and work related to exploitation through business models, interface standard and recommendations to policy and decision makers.

- **T2.1 -> T2.4 -> T3.4 -> T3.5 -> T5.5 ->T5.6:** The design parameters from T2.1 are needed to complete the logistics model in T2.4 for updating the SIMPACT tool. While T3.4 also depends on T2.1 to start the transport network re-design, it can start before T2.4 is completed. However, it cannot be completed before T2.4 is concluded, due to the updated SIMPACT from T2.4 will be used to simulate the candidate networks and generate typical voyages for evaluation in T3.5. Task T3.5 will evaluate the performance of the candidate networks from T3.4. This performance evaluation will be the basis for the impact quantification in Task 5.5, combined with the results of T2.2 market analysis and transfer potential. The impact quantification is needed to complete T5.6 recommendations, however T5.6 can start and do most of the work before T5.5 is completed.
- **T4.3->T3.5->...:** the performance evaluation in T3.5 also depends on a hydrodynamic model from T4.3 to be completed.
- **T3.1, T3.2, T3.3 -> T3.5 ->...:** the transport system concepts need to be developed to a sufficient level before the transport system performance evaluation in T3.5 can be done.
- **T3.1 -> T3.4->T3.5...:** The stow and charge hub concept must be developed to a sufficient level before the network candidates in T3.4 can be proposed and evaluated in T3.5.
- **T2.2 -> T3.4->...:** The transport demand modelling will serve as important input for T3.4 and is needed before T3.4 can start. It is also important input for creating the basis for evaluation the performance in T3.5 as it will provide the transportation demand that the network must serve.
- **T4.5 and T4.6 -> T5.2:** while the standard proposal does not depend on the technology development in T4.5 and T4.6 to be completed, it depends on inputs and learning points from these tasks.

Milestone 10 AUTOFLEX ZEM uncrewed vessel concepts validated:

This milestone marks the completion of the AUTOFLEX ZEM uncrewed vessel concepts development and validation activities.

- **T2.1 -> T4.2 -> T4.3 -> T6.4:** Task 2.1 needs to provide the design parameters and boundary conditions, so that the vessel concept development in task 4.2 can start. The Conceptualisation of the vessel needs to be at a sufficient maturity level before the basic design and optimisation of the hull and propulsion can start. Finally, the vessel

design and optimisation need to be completed before the scale model testing in T6.4 can be done.

Management of critical paths:

This initial mapping is intended to be used in the progress monitoring to ensure that the priorities in critical tasks are aligned across the dependent work packages to meet the overall project deadline. It should be noted that this exercise is not completed, as continuous management and coordination is crucial and will be handled by the project coordinator.



6 RISK MANAGEMENT AND QUALITY ASSURANCE

Risk management and quality assurance in AUTOFLEX is followed up by a separate deliverable called D1.3 Quality and Risk Management Plan (QMP), authored by NTUA.



7 DATA MANAGEMENT

This is covered by a separate deliverable, D1.2/D1.8/D1.11 Data Management Plan (DMP) v1/v2/v3.



8 EXPLOITATION AND INNOVATION MANAGEMENT

Exploitation and innovation management are followed up by separate deliverables:

- D1.6/D1.7/D1.10 D&C plan and report v1/v2/v3 and D1.9 Exploitation roadmap
- D1.5 Knowledge and IPR plan



9 MONITORING AND EVALUATION

Continuous monitoring is crucial for the success of the project and for providing the responsible persons with sufficient information for decision making at the right time.

The two main ways of monitoring implemented in the AUTOFLEX project are:

- To check the list of deliverables and milestones
- The preparation of Interim monitoring reports (not to be shared with the EC)

In addition, the preparation of the Periodic Reports as planned in the Grant Agreement (GA) will support the coordinator as well as work package leaders to have a detailed overview of project progress (including technical and financial information).

9.1.1. INTERIM MONITORING REPORTS

Interim monitoring reports are planned at M6 (June 2024), M12 (December 2024), M24 (December 2025) and M30 (June 2026), and will collect information about the status of the project and the progress achieved by each single partner in the tasks/WPs of their responsibility, as well as the progress of the project. These reports shall include information on activities realised, results reached, issues (if any) arose during the period of reference, risk identified, and contingency plans suggested and/or agreed to solve the issues.

The Interim monitoring Reports template will be provided by coordinator, with a structure similar to the template provided by the EC for the preparation of the Periodic Reports. The progress reports will collect the same information (in similar format) of the Periodic Reports to facilitate administrative and technical people involved in the project in the preparation of the periodic reports to the EC, as well as to facilitate the project coordinator in the monitoring of project progress, and in the integration of the information collected to provide consolidated reports to the EC.

The Interim monitoring report is also planned to be used to monitor the alignment of the use of resources (PMs and major costs items) of each partner with respect to what is planned in the DoW. This financial part will be collected in a separate Excel file and will not be submitted to the EC, but only used for internal monitoring of effort/costs vs. activities performed.

9.1.2. PERIODIC REPORTS

The AUTOFLEX project is divided into the following 'reporting periods':

- RP 1: From M1 to M18 (June 2025)
- RP 2: From M19 to M36 (December 2026)

The coordinator must submit a periodic report within 60 days following the end of each reporting period.

The periodic report must include the following:

- (a) A 'periodic technical report' containing:

- i. An explanation of the work carried out by the beneficiaries
- ii. An overview of the progress towards the objectives of the action, including milestones and deliverables

This report must include explanations justifying the differences between work expected to be carried out in accordance with plan and that actually carried out.

The report must detail the exploitation and dissemination of the results and – if required – an updated "plan for the exploitation and dissemination of the results".

The report must indicate the communication activities.

- iii. A summary for publication by the Agency
- iv. The answers to the "questionnaire", covering issues related to the action implementation and the economic and societal impact, notably in the context of the Horizon 2020 key performance indicators and the Horizon 2020 monitoring requirements.

(b) A 'periodic financial report' containing:

- i. An 'individual financial statement' (see GA Annex 4) from each beneficiary and from each linked third party, for the reporting period concerned.
The individual financial statement must detail the eligible costs (actual costs, unit costs

and flat-rate costs; see GA Article 6) for each budget category (see GA Annex 2).

The beneficiaries and linked third parties must declare all eligible costs, even if –

for actual costs, unit costs and flat-rate costs – they exceed the amounts indicated in

the estimated budget (see GA Annex 2). Amounts which are not declared in the individual financial statement will not be taken into account by the Agency.

If an individual financial statement is not submitted for a reporting period, it may be

included in the periodic financial report for the next reporting period.

The individual financial statements of the last reporting period must also detail the

receipts of the action (see GA Article 5.3.3).

Each beneficiary and each linked third party must certify that:

- The information provided is full, reliable and true.
- The costs declared are eligible.
- The costs can be substantiated by adequate records and supporting documentation that will be produced upon request or in the context of checks, reviews, audits and investigations, and
- For the last reporting period: that all the receipts have been declared

- ii. An explanation of the use of resources and the information on subcontracting and in-kind contributions provided by third parties from each beneficiary and from each linked third party, for the reporting period concerned.

- iii. A "periodic summary financial statement", created automatically by the electronic exchange system, consolidating the individual financial statements for the reporting period concerned and including – except for the last reporting period – the request for interim payment.

More details about periodic reports are available in the GA.

The coordinator will inform the consortium about the timing for the preparation of the periodic report and will provide templates to collect the necessary information to complete the periodic technical report.

9.1.3. FINAL REPORT

In addition to the periodic report for the last reporting period, the coordinator must submit the final report within 60 days following the end of the last reporting period.

The final report must include the following:

- A "final technical report" with a summary for publication containing:
 - An overview of the results and their exploitation and dissemination
 - The conclusion on the action, and
 - The socio-economic impact of the action
- A "final financial report" containing:
 - A 'final summary financial statement', created automatically by the electronic exchange system, consolidating the individual financial statements for all reporting periods and including the request for payment of the balance and
 - A 'certificate on the financial statements' (drawn up in accordance with Annex 5) for each beneficiary and for each linked third party, if it requests a total contribution of EUR 325 000 or more, as reimbursement of actual costs and unit costs calculated on the basis of its usual cost accounting practices (see GA).

10 PROJECT MANAGEMENT PLATFORM

Microsoft Teams, see Figure 10-1, has been chosen as the project management platform, which is restricted for partners' internal usage, to facilitate a proper communication and document sharing among the partners in the consortium.

The portal has two main functions:

- Act as repository of all relevant documents (templates, GA, CA, guidelines, list of contacts, etc.) to support the management of the project,
- Be a management tool to exchange documents per WP, plan meetings, follow up on tasks and actions, etc.

Each person, associated to the partners of AUTOFLEX, has been granted an exclusive access to the portal, with username and password. Each beneficiary is responsible for defining and communicating to the project coordinator the names of those authorized to access the portal.

In addition, Work Package leaders are able to manage the folder of their own WP, organising and sharing the documentation with the people involved in the specific WP. The folder structure is the same for all the WPs, to ensure consistency.

Figure 10-1 also shows the main channels of AUTOFLEX in MS Teams (one channel per WP in addition to the "General" channel).

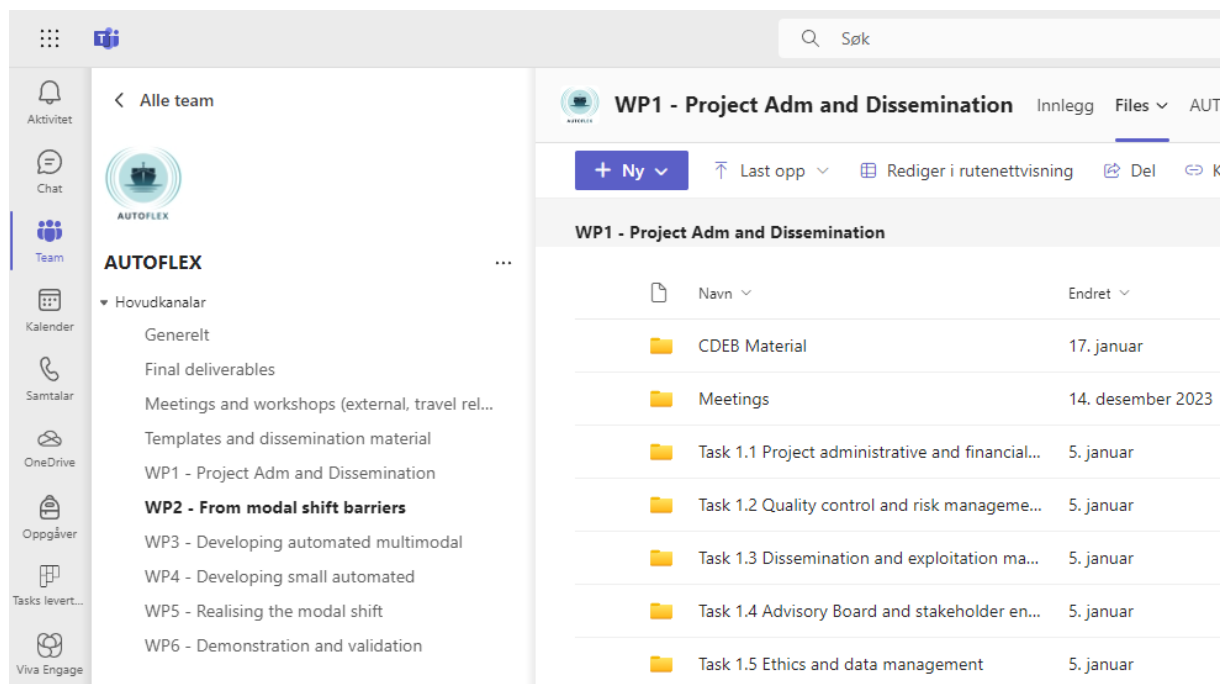


Figure 10-1: Microsoft Teams for AUTOFLEX.