



iMOCO4.E

Intelligent Motion Control under Industry 4.E

D1.3 - Project website functional

Due Date: M4 – 2021-12-31

Abstract:

This document gives a general review of the IMOCO website which is available at <https://www.imoco4e.eu/> and provides the necessary functions and information to act as a dissemination strategy tool and information recourse of the project. The website will be used by the consortium as well as external stakeholders, to disseminate the project's activities, outputs, findings and the whole research progress of the project.

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Executive Summary

Deliverable D1.3 “Project Website Functional” is produced within Work Package 1 (Project management and liaison with other Lighthouse projects) of the IMOCO4.E project, under Task1.1.

This document gives a general review of the IMOCO4.E website which is available at <https://www.imoco4e.eu/> and provides the necessary functions and information to act as a dissemination strategy tool and information recourse of the project. The website will be used by the consortium as well as external stakeholders, to disseminate the project’s activities, outputs, findings and the whole research progress of the project.

The main content, functions and the usability of the website will continue to be managed, improved and edited during the project lifetime. Thus, certain menus and images shown in this deliverable are going to change.

1. Introduction

1.1 Purpose of the Document

This document presents the website of the IMOCO4.E project as a dissemination and communication strategy tool for worldwide audience, comprising a comprehensive provision of information, as well as a shared platform for the project team. The IMOCO4.E website address and links to social media pages will be included in all dissemination materials of the project (fliers, leaflets, posters, newsletters and other promotional material).

1.2 Structure of the Document

The document is structured in a way similar to how a visitor would navigate in the project's webpages; it presents the components of the IMOCO4.E website with images as screenshots of the pages, starting from the website home page, the "OVERVIEW" tab and all relevant sub-tabs (About, Platform, Use Cases, Consortium), the "NEWS" tab, the "DOWNLOADS" tab and its subcomponents (Deliverables, Publications, Multimedia) and finally the "CONTACT US" tab.

1.3 Intended readership

This document is intended for both consortium members and external to the project stakeholders, since it comprises a rich information content platform about the project's main principles, components, participants, latest news and upcoming actions.

2. Website Home Page

The "Home" page of the IMOCO4.E (<https://www.imoco4e.eu/>) website serves the following functions:

- ✓ It provides access to the other sections of the website (main menu);
- ✓ It presents a short overview of the IMOCO4.E project, the main scope and objectives;
- ✓ It informs about the latest news and events and also for the upcoming events
- ✓ It provides links to IMOCO4.E's social media accounts.
- ✓ It provides link to IMOCO4.E newsletter subscription

The IMOCO4.E Home Page is presented in **Figure 1**.

3. Overview Page

The Overview Tab contains four (4) different subsections:

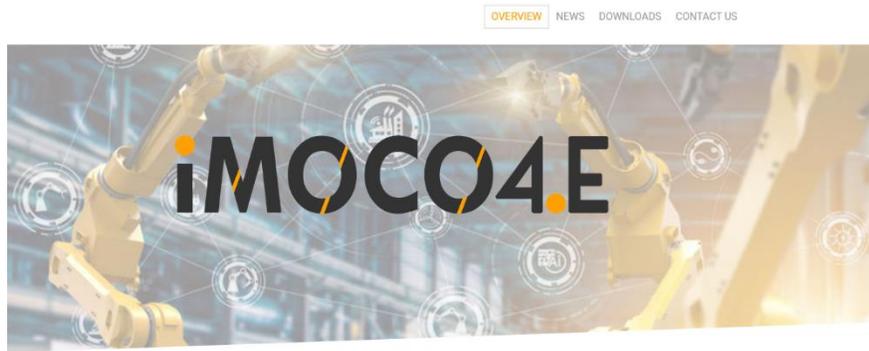
- ✓ “About” subsection
- ✓ “IMOCO4.E Platform” Subsection
- ✓ “Pilots, Demonstrators & Use Cases” Subsection and
- ✓ “Consortium” Subsection

Below we provide details for each of the above.

3.1 “About” IMOCO4.E Subsection

The “About” tab of the IMOCO4.E website presents four components (Figure 2):

- ✓ The Mission,
- ✓ The Impact
- ✓ The Scientific & technical development objectives and
- ✓ Work Package Structure



Overview » About IMOCO4.E

Overview

IMOCO4.E targets to provide vertically distributed edge-to-cloud intelligence for machines, robots and other human in-the-loop cyber-physical systems having actively controlled moving elements. They face ever-growing requirements on long-term energy efficiency, size, motion speed, precision, adaptability, self-diagnostic, secure connectivity or new human-cognitive features.

IMOCO4.E strives to perceive and understand complex machines and robots. The two main pillars of the project are digital twins and AI principles (machine/deep learning). The subsequent mission is to bring adequate edge intelligence into the instrumentation and Control Layers, to analyse and process machine data at the appropriate levels of the feedback control loops and to synchronise the digital twins with either simulated or real-time physical world. At all levels, AI techniques are employable.

Summing up, IMOCO4.E strives to deliver a reference platform consisting of AI and digital twin toolchains and a set of mating building blocks for resilient manufacturing applications. The optimal energy efficient performance and easy (re)configurability, traceability and cyber-security are crucial. The [IMOCO4.E reference platform](#) benefits will be directly verified in applications for semicon, packaging, industrial robotics and healthcare. Additionally, the project demonstrates the results in other generic motion-control-centred domains. The project outputs will affect the entire value chain of the production automation and application markets.



Impact

IMOCO4.E will significantly strengthen European industrial competitiveness through the [IMOCO4.E reference platform](#), which will be directly verified in applications for semiconductor, packaging, industrial robotics and healthcare. Additionally, the project demonstrates the results in other generic "motion-control-centred" domains. It will bridge the gap between the latest research results and industrial practice to improve performance as measured by a whole variety of parameters including response time, reliability, predictive maintenance, control accuracy and error. Furthermore, a reduction of 40% in the development of digital twins of a machine tool can be expected by the application of the model-based approach. The envisioned platform will be particularly suitable for applications where the dynamics and precision of the controlled motion are crucial and not straightforward. Easy re-configurability and/or reuse is of benefit for being flexible during the development.

IMOCO4.E mainly relates to the following major challenges from the [ECSEL Multi Annual Strategic Plan](#) (ECSEL MASP 2020):

- Managing critical, autonomous, cooperating, evolvable systems (Chapter 6)
- Increasing compactness and capabilities by functional and physical systems integration (Chapter 6)
- Safety, security and privacy by design (Chapter 8)
- Increasing performance at acceptable costs (Chapter 9)
- Making computing systems more integrated with the real world (Chapter 9)
- Making "intelligent" machines (Chapter 9)
- AI-enabled cognitive, resilient, adaptable manufacturing (Chapter 4)
- Moving healthcare from hospitals into our homes and daily life requiring preventive and patient centric care (Chapter 2)

Scientific & technical development objectives

- To develop advanced model-based and knowledge-based methods for building digital twins for design, optimization, customization, virtual commissioning and predictive maintenance of machines and robots, using existing and novel data sets
- To develop a smart Instrumentation Layer gathering and processing visual and/or sensor information from supplementary instrumentation installed on the moving parts of the controlled system (i.e., at the edge) to enhance the achievable performance and energy efficiency during whole system lifecycle
- To develop modular unified, Hardware and Software motion control building blocks
- Ensure secure interoperability with State-of-the-Art cloud platform, i.e. System Behaviour Layer – Layer 3 and develop specific condition monitoring building blocks providing relevant data for machine digital twins and system behaviour layer, further used either for machine predictive maintenance or re-design, virtual design and optimization; contribute to EU Open Datasets.

Work packages

The project is structured into 8 work packages:

- WP1:** Project management and liaison with other Lighthouse projects. [More...](#)
- WP2:** Business requirements and reference system architecture. [More...](#)
- WP3:** Perception and instrumentation Layer based on AI at the edge. [More...](#)
- WP4:** Smart Control Layer design and development. [More...](#)
- WP5:** Digital Twins and their interaction with the cloud. [More...](#)
- WP6:** Implementation and integration of IMOCO4.E framework. [More...](#)
- WP7:** Pilots and demonstrators. [More...](#)
- WP8:** Dissemination, exploitation, communication activities. [More...](#)

Figure 2: IMOCO4.E About Page

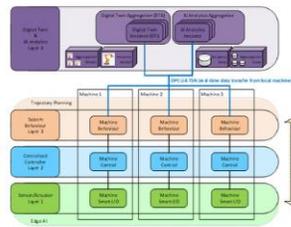
3.2 IMOCO4.E Platform Subsection

In this page we present the reference IMOCO4.E Platform and how technological layers are connected with the Building Blocks, the Pilots and Demonstrators (**Figure 3**).



Overview » IMOCO4.E platform

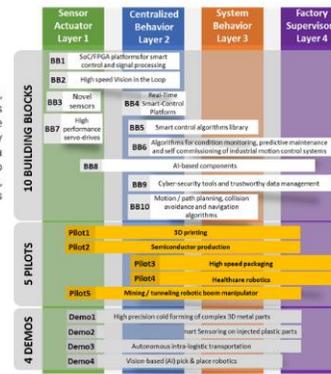
Reference platform



Building on top of the **IMECH** architecture, the IMOCO4.E architecture is enhanced with **Layer 4 - Supervisory control** within which methodologies such as Digital Twins, Servitization concepts, AI/data analytics will be implemented across all layers. Additional focus will be given also on

- HW/SW performance;
- System behaviour;
- Edge processing/intelligence;
- Navigation/path planning;
- Cybersecurity;
- Decision making; and
- Model-based systems engineering.

IMOCO4.E combines and exploits novel sensory information, model-based approaches and Industrial Internet-of-Things philosophies to make mechatronic systems smarter, more configurable, more reliable and faster while simultaneously pushing their performance toward physical limits. From a long-term viewpoint, IMOCO4.E will utilize digital twins to optimize machines over their full lifecycles. In this framework, IMOCO4.E will achieve its goals through 10 Building Blocks (BBs), 5 Pilots and 4 Demonstrators.



Building blocks

The "digital transformation" is boosted by the "data and analysis hunger" of social media platforms and the online sales business. With growing maturity and the economy of scale of the involved HW and SW, a trend has been initiated to connect more "information" to this infrastructure. The word "Information" was chosen deliberately. Equipment can generate Gigabytes of data but can only "interpret" a limited set in real-time. In **IMECH** we introduced a reference framework to deal with this challenge through a layered approach that we called "Master the behaviour of controlled interaction with physics". It helped to explain that tangible Building Blocks (BBs) often require "components" at different layers. In IMOCO4.E the following BBs has identified:

- Building block 1:** SoC/FPGA platforms for smart control and signal processing
- Building block 2:** High speed Vision in the Loop
- Building block 3:** Novel sensors (new type of sensors, wireless communications, self powered, low-powered)
- Building block 4:** Real-Time Smart-Control Platform
- Building block 5:** Smart control algorithms library
- Building block 6:** Algorithms for condition monitoring, predictive maintenance and self commissioning of industrial motion control systems
- Building block 7:** High performance servo-drives
- Building block 8:** AI-based components
- Building block 9:** Cyber-security tools and trustworthy data management
- Building block 10:** Motion / path planning, collision avoidance and navigation algorithms

Figure 3: IMOCO4.E Platform Page

3.3 IMOCO4.E Pilots, demonstrators & use-cases Subsection

In this page we describe the pilots, demonstrators and use-cases that will be implemented within IMOCO4.E project in order to validate and evaluate the IMOCO4.E integrated solution (**Figure 4**).

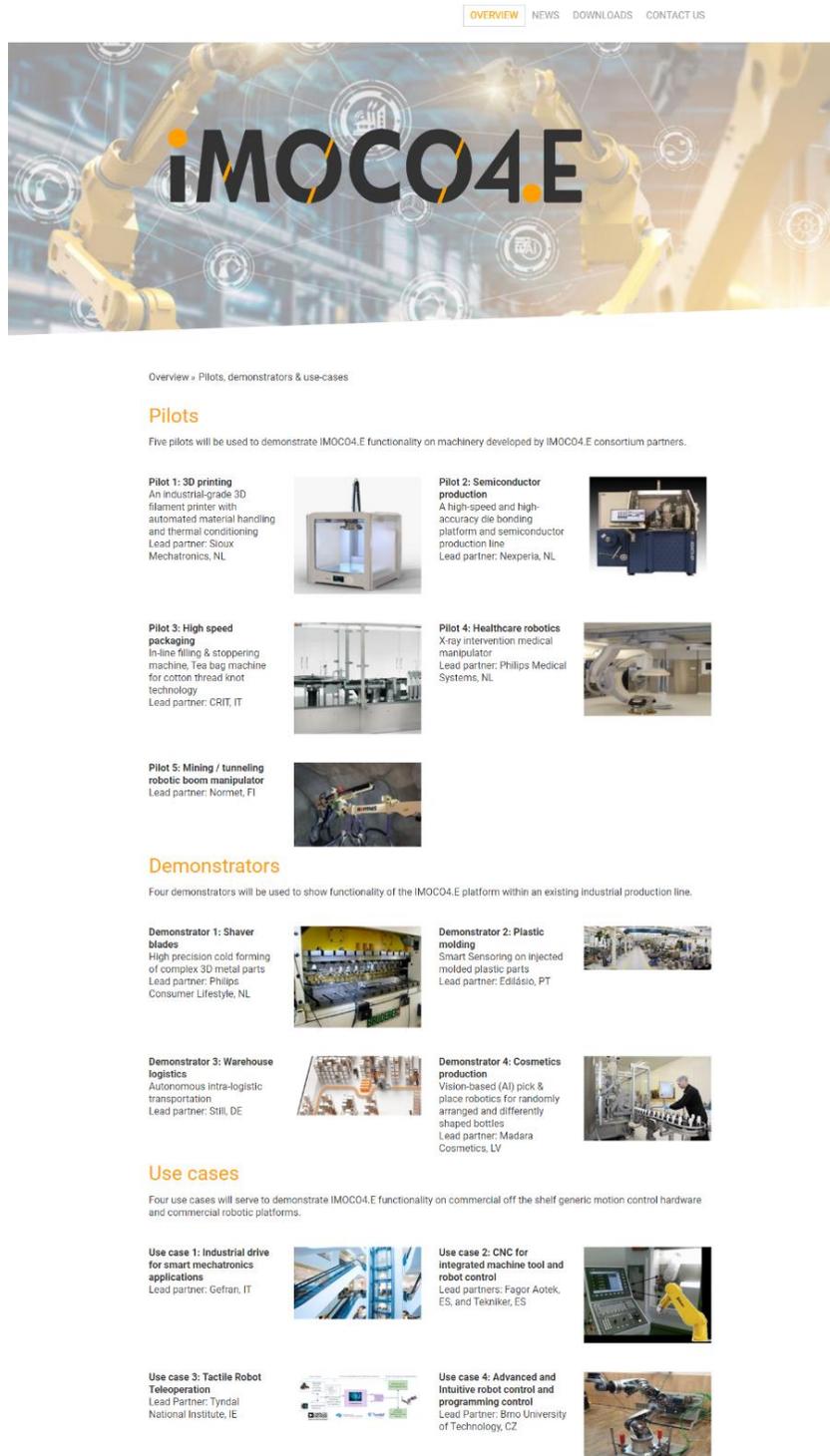


Figure 4: IMOCO4.E Pilots, Demonstrators, Use cases Page

3.4 IMOCO4.E Consortium Subsection

The “Consortium” tab of the IMOCO4.E website presents key facts for the project and a map of EUROPE that highlights 13 countries that IMOCO4.E partners are coming from. In this page, we also provide all 46 project partners logo and by clicking on each logo, redirects the user to the partner’s official website, where further information about the company can be found (Figure 5).



Figure 5: IMOCO4.E Consortium Page

4. News Page

The “News” tab of the IMOCO4.E website provides information in relation to various project events and meetings (Figure 6).

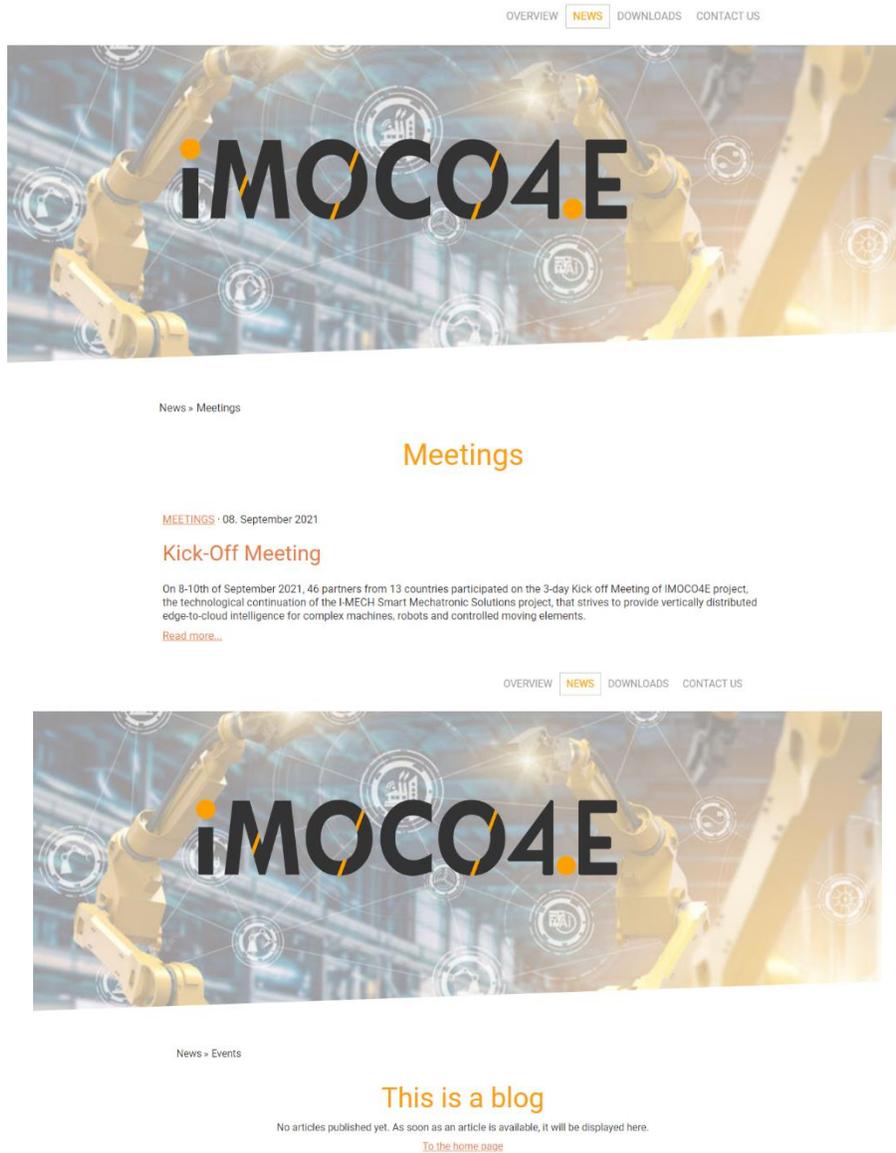


Figure 6: IMOCO4.E News Page

5. Downloads Page

The IMOCO4.E project will publish information and results through various channels. All [deliverables of the project](#) are listed on the website and public deliverables will be published on this website (**Figure 7**). The IMOCO4.E project will also disseminate knowledge through [publications in scientific journals and magazines](#), participation in [events, international fairs and conferences](#), trainings and seminars.

OVERVIEW | NEWS | **DOWNLOADS** | CONTACT US



Downloads > Deliverables

Deliverables

ID	Title	Type	Dissemination level			
D1.1	Project management and quality assurance plan	Report	Confidential	D6.1	Guideline of IMOCO4.E methodology and toolchains	Report Public
D1.2	Project portal	Other	Confidential	D6.2	Digital integration plan	Report Public
D1.3	Project website	Other	Public	D6.3	Test benchmarking and strategy	Report Confidential
D1.4	Midterm report	Report	Confidential	D6.4	Validation reports (first iteration)	Report Confidential
D1.5	Midterm progress report	Report	Confidential	D6.5	Evaluation and test reports (first iteration)	Report Confidential
D1.6	Midterm report	Report	Confidential	D6.6	Validation reports (final iteration)	Report Confidential
D1.7	Overview of connections with other Industry4.0 initiatives	Other	Public	D6.7	Guideline of IMOCO4.E methodology and toolchain (final version)	Report Confidential
D1.8	Project evaluation	Other	Classified	D6.8	Platform deployment with commercial products and robotic platforms (first final version)	Report Confidential
D2.1	State-of-the-art methods in Digital Twinning for motion-driven high-tech applications	Report	Public	D6.9	Digital Twin integration (final report)	Report Public
D2.2	Needs for future smart production in Europe from the mechatronics and robotic point of view	Report	Public	D6.10	Evaluation and test reports (final iteration)	Report Confidential
D2.3	Overall requirements on IMOCO4.E reference framework	Report	Public	D7.1	Definition of the pilots	Report Confidential
D2.4	General specification and design of IMOCO4.E reference framework	Report	Public	D7.2	Definition of demonstrators	Report Confidential
D3.1	Perception and instrumentation Layer requirements and specifications (first iteration)	Report	Public	D7.3	Pilot 1: integration and validation report (initial version)	Report Confidential
D3.2	Perception and instrumentation Layer requirements and specifications (final iteration)	Report	Public	D7.4	Pilot 2: integration and validation report (initial version)	Report Confidential
D3.3	Novel low/self-powered real-time sensors (BB3)	Demonstrator	Confidential	D7.5	Pilot 3: integration and validation report (initial version)	Report Confidential
D3.4	New SoC+FPGA and multi-processor platforms for AI and smart data processing (RR1)	Demonstrator	Confidential	D7.6	Pilot 4: integration and validation report (initial version)	Report Confidential
D3.5	AI based high speed perception and vision (BB2, BB9)	Demonstrator	Confidential	D7.7	Pilot 5: integration and validation report (initial version)	Report Confidential
D3.6	High Performance servo drives, variable speed drives (JB7)	Demonstrator	Confidential	D7.8	Pilot 1: integration and validation report (final version)	Demonstrator Confidential
D3.7	Final design report on Perception & Instrumentation Layer	Report	Public	D7.9	Pilot 2: integration and validation report (final version)	Demonstrator Confidential
D4.1	Requirements for advanced motion control (first iteration)	Report	Public	D7.10	Pilot 3: integration and validation report (final version)	Demonstrator Confidential
D4.2	Requirements for advanced motion control (final iteration)	Report	Public	D7.11	Pilot 4: integration and validation report (final version)	Demonstrator Confidential
D4.3	Design report on intelligent motion control algorithms	Report	Confidential	D7.12	Pilot 5: integration and validation report (final version)	Demonstrator Confidential
D4.4	Report on multivariable motion control and data driven learning	Report	Confidential	D7.13	Demo 1: integration and validation report (initial version)	Report Confidential
D4.5	Development guideline report on path planning, collision avoidance, and navigation	Report	Confidential	D7.14	Demo 2: integration and validation report (initial version)	Report Confidential
D4.6	Software for predictable multi-processor edge platforms	Report	Confidential	D7.15	Demo 3: integration and validation report (initial version)	Report Confidential
D4.7	Report on Appropriate XIL toolchain for optimized design of motion control algorithms	Report	Confidential	D7.16	Demo 4: integration and validation report (initial version)	Report Confidential
D4.8	Final design report on advance control layer development final report	Report	Public	D7.17	Demo 1: integration and validation report (final version)	Demonstrator Confidential
D5.1	Integral (system level) requirements for valuable learning methods (first iteration)	Report	Public	D7.18	Demo 2: integration and validation report (final version)	Demonstrator Confidential
D5.2	Integral (system level) requirements for valuable learning methods (second iteration)	Report	Public	D7.19	Demo 3: integration and validation report (final version)	Demonstrator Confidential
D5.3	Trustworthy and Secure Dataset management, storage and processing tools	Demonstrator	Confidential	D7.20	Demo 4: integration and validation report (final version)	Demonstrator Confidential
D5.4	Algorithms for condition monitoring, predictive maintenance and self-optimization of industrial motion control systems	Demonstrator	Confidential	D7.21	Best practices learned from Pilots and Demos	Report Public
D5.5	Modelling and simulation of complex multi-axis systems	Report	Confidential	D8.1	Dissemination and exploitation plan	Report Confidential
D5.6	Augmented and virtual reality through digital twins	Report	Confidential	D8.2	Stakeholders engagement (initial version)	Report Confidential
D5.7	AI methods for monitoring and predictive maintenance at higher IMOCO4.E layers	Demonstrator	Confidential	D8.3	Dissemination and communication activities	Report Confidential
D5.8	Report on digital twins, corresponding supporting technologies and their interaction with the cloud	Report	Public	D8.4	Stakeholders' engagement, exploitation and standardization activities	Report Confidential
				D8.5	Training activities	Report Public
				D8.6	The IMOCO4.E center	Report Classified
				D8.7	The IMOCO4.E eBook	Report Public
				D8.8	The final IMOCO4.E sustainability plan towards business continuation	Report Classified
				D8.9	Collaboration portal and sustainability via Lighthouses	Report Public

Figure 7: IMOCO4.E Deliverables page

6. Contact Us Page

In this page we encourage the user to connect with us and subscribe to our newsletter in order to be informed about project updates, breakthroughs and outcomes (**Figure 8**).

OVERVIEW NEWS DOWNLOADS **CONTACT US**

Contact us

The IMOCO4.E consortium will come up with methodologies and building blocks that can be applied as a fundament for your ambition too! When you're interested, please let us know or follow us on LinkedIn!

Name *

Email *

Message *

Please enter the code:

Our [Privacy Policy](#) applies.

Note: Please fill out the fields marked with an asterisk.

Follow us:

[in](#) [Contact with LinkedIn](#)

The IMOCO4.E project is funded by:

 **ECSEL**
Joint Undertaking 

Subscribe to the IMOCO4.E newsletter:

email address

[Privacy Policy](#) / [Cookie Policy](#) / [Sitemap](#)

Figure 8: IMOCO4.E Contact Us Page

Conclusion

The IMOCO4.E website has been created by SIOUX, responsible for deliverable D1.3, with the support of ITML. The website will be continuously managed by SIOUX and ITML throughout the project duration and will be maintained three years beyond the end of the project. The project website will act as a project management tool and an information repository, and together with the social media channels (LinkedIn and Twitter) will serve as a dissemination tool during and beyond the end of the project.