



Grant Agreement N°101092861

# Making the Invisible Visible for Off-Highway Machinery by Conveying Extended Reality Technologies

## DELIVERABLE 7.2 – IMPACT ACTIVITIES (FIRST VERSION)

This work is part of the THEIA<sup>XR</sup> project that received funding from the European Union's Horizon Europe research and innovation program under grant agreement no. 101092861



# Document Identification

## Project THEIA<sup>XR</sup>

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## Executive summary

The project THEIA<sup>XR</sup> was launched in January 2023 as a new Research and Innovation Activity (RIA). The brand, the ecosystem as well as all dissemination activities had to be established anew. The Work Package 7 (WP7) especially the Task 7.1. therefore, focused on dissemination & ecosystem building. In this deliverable the work of WP7 and especially the subtasks in Task 7.1. and Task 7.2 are outlined.

The Task 7.1 covered the planning, carrying out and monitoring of communication and dissemination activities with the aim to build an ecosystem around the THEIA<sup>XR</sup> objectives, development and results. The strategic goal was and still is to create a sustainable impact that will last beyond the end of the project by making the results of the research known to those who could benefit from them. During the first reporting period the consortium members have been focussing on awareness creation and communication foundation, as specified for the first phase of communication and dissemination. To ensure this goal a communication and ecosystem strategy has been developed that is outlined in this report. In Month 18 of the project, a first recap shows that the planned activities could be delivered. Activities are continued in the second phase on community outreach.

The Task 7.2 covers the exploitation of project key exploitable results (KER) and the development of an appropriate strategy to create the planned impact of THEIA<sup>XR</sup>. In conjunction with Task 7.1 the stakeholder groups of the project have been identified and targeted during the dissemination events to support exploitation activities during the second half of the project. During the second phase “community outreach and initial results dissemination” (M13-M24) the assessment of the first available technological demonstrators is ongoing to identify potential key exploitable results of the project. Since the project is classified as RIA most results will be available in the second phase of the project, when the necessary maturity of the technological solutions has been achieved. Nevertheless, the exploitation framework utilized in THEIA<sup>XR</sup> is presented and described in this report.

In the ongoing development and decisions concerning the projects dissemination, exploitation and innovation potential, the consortium will continue to execute the communication strategies to leverage the ecosystem of the project. Exploitation activities will follow the framework introduced towards the planned impact KPIs. The next actions of Task 7.2 are the collection of exploitable technologies and the development of their market potential and business models respectively to achieve a sustainable impact beyond the duration of THEIA<sup>XR</sup>.

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# 1. Introduction

This deliverable is intended to report on dissemination, communication and impact creation methods and strategies that the THEIA<sup>XR</sup> consortium will follow, as well as the relevant activities until M18 of the project. This report is intended to be read by all consortium members.

WP7 aims to maximise the exploitation and to generate societal, economic and scientific impact of the THEIA<sup>XR</sup> results by disseminating project results among the scientific, business and startup community in Europe and globally, as well as among decision makers, relevant stakeholders and the interested public. It also has the objective to strengthen the research and knowledge base of all relevant stakeholders through presentation of the THEIA<sup>XR</sup> work and results.

Chapter 2 summarizes the activities on communication and dissemination of project achievements during the reporting period. The results so far in Task 7.1 concerning ecosystem building are reported and the achievements following the communication strategy and plan outlined in D7.1 are highlighted. The report thus summarises the efforts taken to follow the THEIA<sup>XR</sup> marketing strategy to ensure a coordinated and coherent approach. The project related publications and peer-reviewed papers are listed as well as various events the consortium has participated to foster the project's brand creation.

Chapter 3 introduces the impact creation framework used during the project. The three-pillar approach structures the different dimensions (i) results, (ii) stakeholder, and (iii) business strategy. During Task 7.2 activities, and along these pillars, different activities are performed, following the methodology presented in Section 3.2. The target of developing an exploitation plan/strategy for the outcomes and results of the project will be supported by the methods and activities described there. The consecutive document of this report will include the individual exploitation insight for every member of the THEIA<sup>XR</sup> consortium, outlining each members' organizational background, foreseen exploitable results, and individual exploitation strategy. Potential joint exploitation plans will also be included in future versions of this report (D7.5).

## 2. Dissemination and Communication Strategy

The communication and dissemination strategy, that the THEIA<sup>XR</sup> project is following is depicted in Figure 1. As it can be seen, the strategy is divided into 3 phases, following the project evolution with phase 1, focusing on awareness creation and communication foundation, phase 2 with community outreach and initial results dissemination and phase 3, global outreach and sustainable impact.

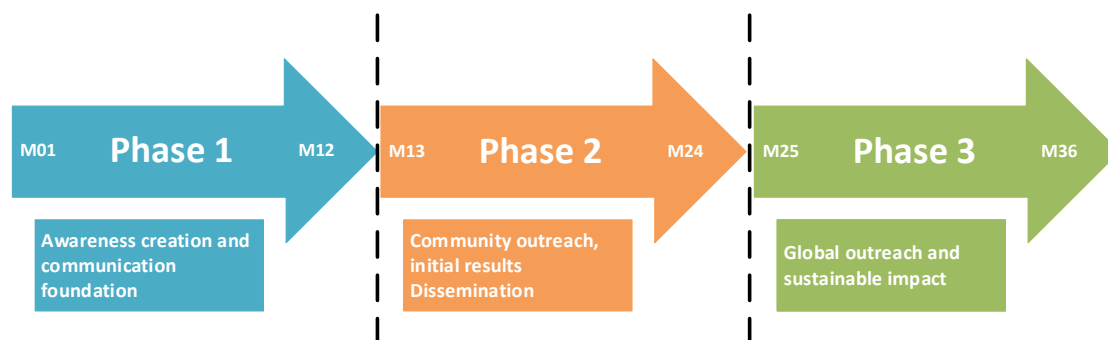


Figure 1: THEIA<sup>XR</sup> dissemination and communication phases

At the time of writing of this deliverable, we are in the middle of phase 2, “community outreach and initial results dissemination” including a preparatory ramp-up of “global outreach and sustainable impact, Phase 3.

### 2.1. THEIA<sup>XR</sup> Communication

In this chapter, the THEIA<sup>XR</sup> communication channels and material are described. These activities are strongly connected to phase 1, “awareness creation and communication foundation” and are of course continued during the phases 2 and 3 as they are supporting the outreach of the respective phase. From a strategical perspective, the LinkedIn site has been chosen to focus on traffic and community outreach, while the website and the later established YouTube channel to support phase 2 are rather a mean of providing the content to the interested reader digging deeper into the topic.

#### 2.1.1. Communication channels

##### *THEIA<sup>XR</sup> Website*

The THEIA<sup>XR</sup> website is hosted and authored by TTC as coordinator of the project. It provides a comprehensive description of the THEIA<sup>XR</sup> project, presents the Use Cases as well as the most current news and results. Reading through the website, the interested audience is provided with all relevant material to get a status of the current activities performed in the project.

This website is also a prominent example of the strong project identity, created at the beginning of the project. The logo is designed to present all three use cases including, with the colours ranging from darker to lighter ones representing the “making the invisible visible” through XR.



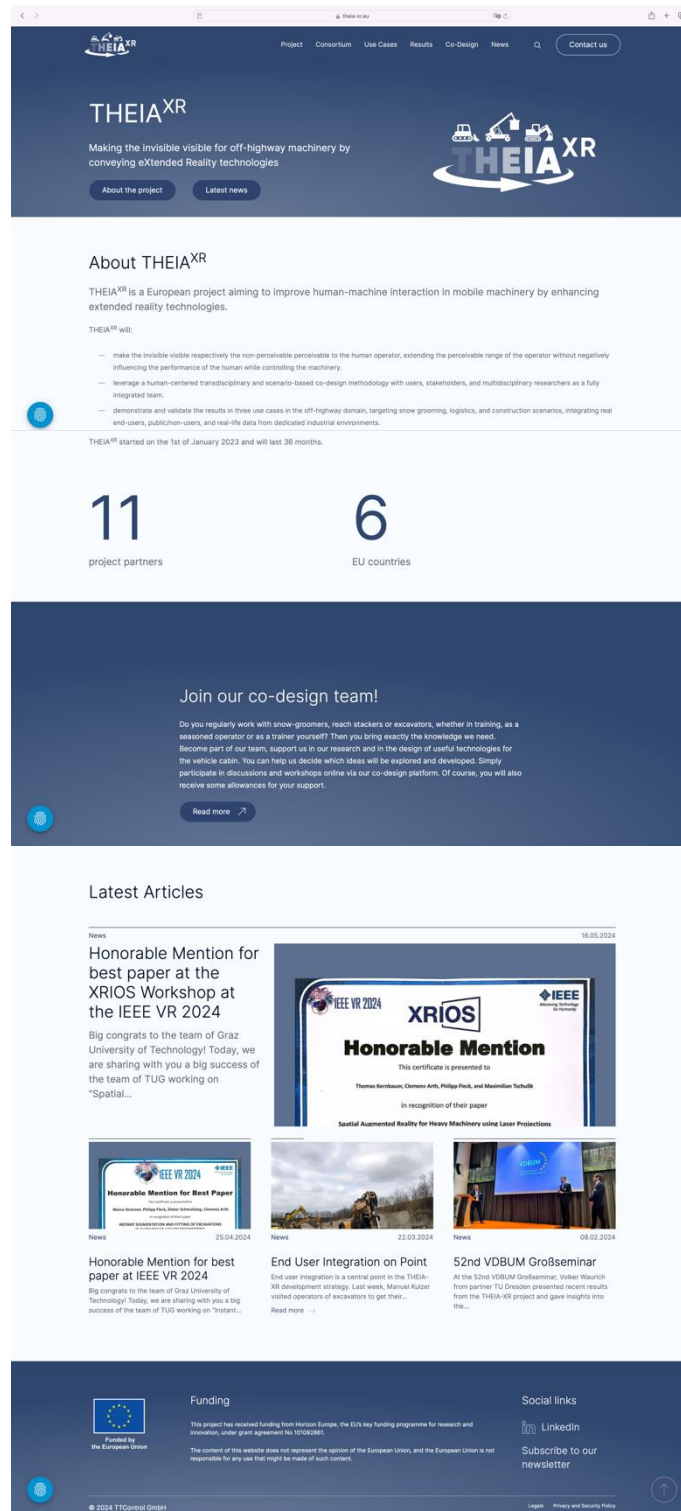


Figure 2: THEIA<sup>XR</sup> Website – LandingPage

### LinkedIn Presence

Due to the B2B orientation of the network, LinkedIn has been chosen as social media channel for the project. A corresponding site has been created at the very beginning of the project and since then, continuously and strategically been maintained and enlarged. Up until the writing of this deliverable, the THEIA<sup>XR</sup> project has attracted 340 followers and the connected LinkedIn newsletter, published on a semi-annual basis, has 160 subscribers.

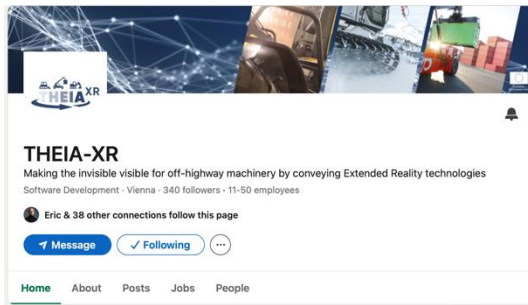


Figure 3: THEIA<sup>XR</sup> LinkedIn site

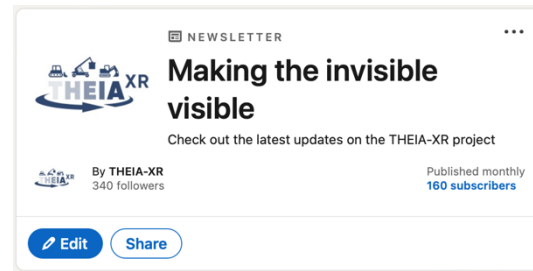


Figure 4: THEIA<sup>XR</sup> LinkedIn Newsletter

In the period from project start until end of June 2024, THEIA<sup>XR</sup> has reached 42.307 impressions on the posts and attracted 10.902 visitors to the LinkedIn site. Besides these pure numbers, interesting exchange and promising connections for phase 3 have already been established via LinkedIn (representatives from KOMATSU and a mining project have reached out to project participants to learn more about THEIA<sup>XR</sup>).

### YouTube Presence

As already mentioned, the presence on YouTube does not have the reason to establish a further social network that is strategically maintained. However, it is more a platform for videos to be linked to the THEIA<sup>XR</sup> website and to be spread on LinkedIn. With more results being available in phase 2, the YouTube channel will be filled with videos showing results from the project.

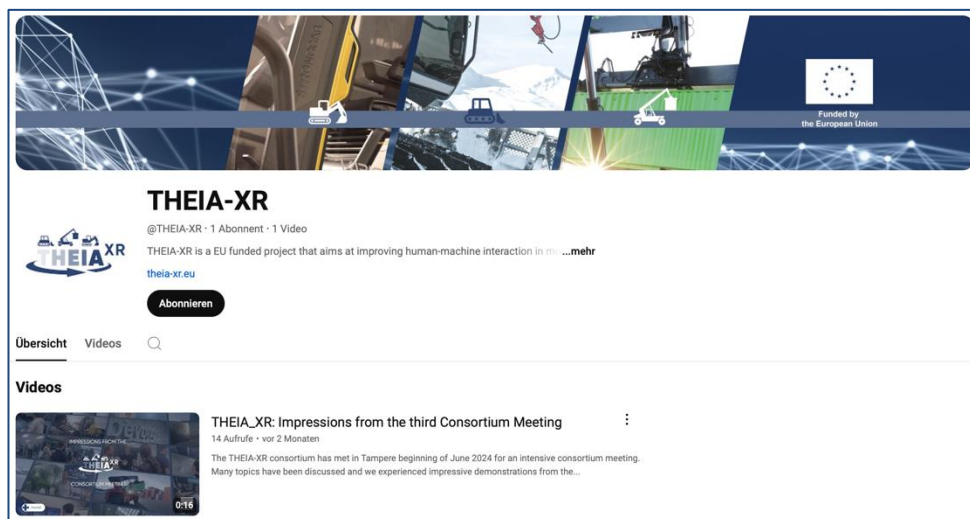


Figure 5: THEIA<sup>XR</sup> YouTube Channel<sup>1</sup>

### Newsletter

As shortly introduced in chapter 0, the THEIA<sup>XR</sup> project has established a semi-annual newsletter that is populated over LinkedIn, but as well provided as PDF, published on Zenodo and linked on the THEIA<sup>XR</sup> website. Up until the writing of this deliverable, 2 editions of the newsletter have already been published.

Newsletter edition	Zenodo views	Zenodo download	LinkedIn impressions
THEIA <sup>XR</sup> newsletter edition No 1 <sup>2</sup>	39	30	1625
THEIA <sup>XR</sup> newsletter edition No 2 <sup>3</sup>	45	53	2109

Table 1: THEIA<sup>XR</sup> Newsletter Analytics<sup>4</sup>

<sup>1</sup> <https://www.youtube.com/@THEIA-XR>

<sup>2</sup> <https://zenodo.org/records/10419142>

<sup>3</sup> <https://zenodo.org/records/10816415>

<sup>4</sup> Analytics dated 2024-08-15

## Zenodo

THEIA<sup>XR</sup> has created a Zenodo community to provide the results generated in the project to the broader audience. As already been introduced in previous chapters, the content provided there is linked to the THEIA<sup>XR</sup> website and shared on LinkedIn.

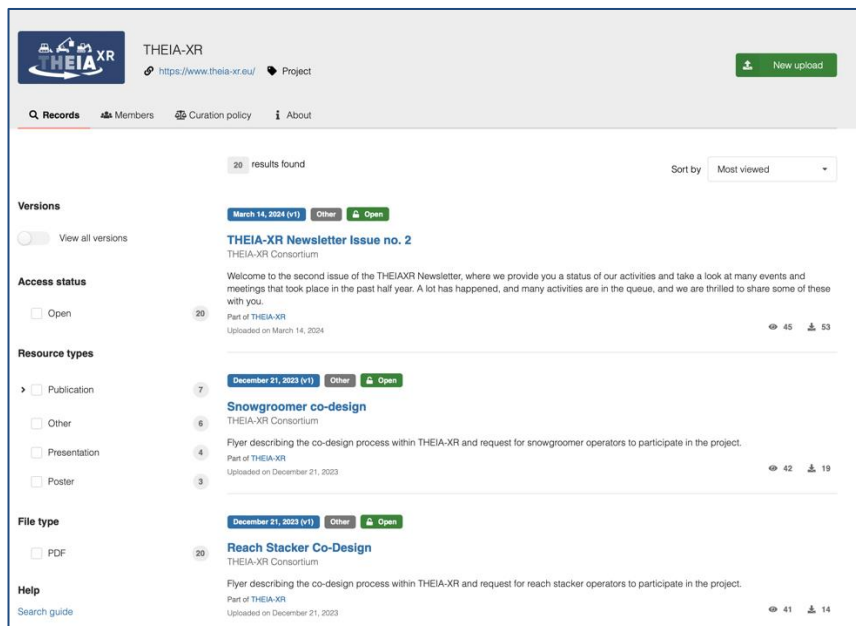


Figure 6: THEIA<sup>XR</sup> Zenodo community<sup>5</sup>

## 2.1.2. Communication material

The THEIA<sup>XR</sup> project has created a number of communication material, following the strong project identity and is sharing these wherever possible and feasible.

### THEIA<sup>XR</sup> Flyer

Flyers are created and produced whenever considered necessary and helpful to support the project execution. Consequently, a general project flyer describing the project, the use cases and the partnership has been created at the beginning of the project.



Figure 7: THEIA<sup>XR</sup> project leaflet<sup>6</sup>

Additionally, to this general project flyer, the process of attracting operators for the co-design process was calling for specific flyers that have been produced for each use case and in a number of languages.

<sup>5</sup> <https://zenodo.org/communities/theia-xr>

<sup>6</sup> <https://zenodo.org/records/10400698>

<p><b>Who is behind it?</b></p> <p>Our project team consists of more than 30 researchers from Austria, Germany, Italy, France, Luxembourg and Finland. The project is funded by the European Union.</p>	
<p><b>More information on the project:</b> www.theia-xr.eu</p> <p><b>Co-Design registration:</b> www.pretix.eu/theia-xr/co-design</p> <p> <b>Funded by the European Union</b></p> <p><small>Funded by the European Union. However, the views and opinions expressed are solely those of the author(s) and do not necessarily reflect the views of the European Union or the European Commission. Neither the European Union nor the European Commission can be held responsible for them.</small></p>	<p><b>WE NEED YOU</b> FOR THE CO-DESIGN OF NEW TECHNOLOGIES FOR THE VEHICLE CABIN!</p>

<p><b>How can you help?</b></p> <p>Do you regularly work with snow groomers, whether in training, as a seasoned vehicle operator or as a trainer? Then you bring exactly the knowledge we need. Become part of our research team, support us in the design of useful technologies for the vehicle cabin and help us decide which designs are implemented. Simply online via our <b>co-design platform</b>. Of course, you will also receive some allowances for your support.</p>	<p><b>What is the project about?</b></p> <p>We want to make working with heavy machinery easier, more pleasant and safer. We want to achieve this by developing new so-called Extended Reality (XR) technologies that make previously invisible or hard-to-perceive information visible. Imagine, for example, being able to see your surroundings and obstacles clearly from inside the cabin, even in a snowstorm. How exactly this could work is being researched in the project.</p>
<p><b>Co-Design</b></p> <p>means for us that the operators of the vehicles for which we develop technologies can become part of the design team as experts in their field of work.</p>	<p><b>Extended Reality</b></p> <p>is an umbrella term that covers various technologies such as enhanced visualisation, improved acoustics or vibration feedback.</p>

Figure 8: Co-Design Flyer, example Snowgroomer<sup>7</sup>

### THEIA<sup>XR</sup> Roll Up

As it was the case for the Flyer, also a THEIA<sup>XR</sup> roll-up has been created at the beginning of the project to present the project in booths and during presentations.

The roll-up banner features the THEIA XR logo at the top, followed by the tagline "Making the Invisible Visible for Off-Highway Machinery by Conveying Extended Reality Technologies". Below this, three images show a snowgroomer, a reachstacker, and an excavator, each with a small icon of the machine. The bottom section contains logos for partner organizations: TTControl, TU, Technische Universität Dresden, Hochschule der Medien, uni.lu, Creanex, H2P Lab, KALMAR, VTT, and Purok. The footer includes the website www.theia-xr.eu, project details (starting date: 01/01/2023, duration: 36 months, PI: Christoph Eder, Deputy Coordinator: Gerald Fitz/Mayra ITTC), and a QR code. A small text block at the bottom right states: "This project has received funding from the European Union's Horizon programme for research and innovation under grant agreement No 101019066. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Commission. Neither the European Union nor the European Commission can be held responsible for them."

Figure 9: THEIA<sup>XR</sup> Roll-up<sup>8</sup>

Two other roll-ups have been created to support the co-design process of the project:

<sup>7</sup> <https://zenodo.org/records/10419066>

<sup>8</sup> <https://zenodo.org/records/10400728>

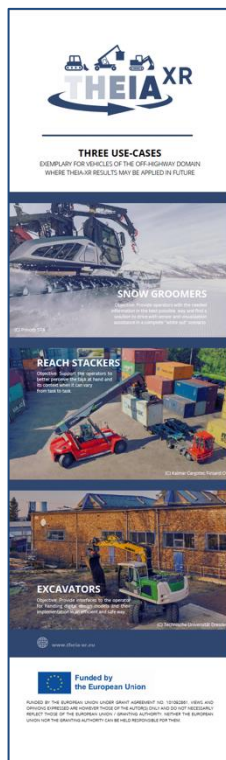


Figure 10: Roll-Up UseCases<sup>9</sup>

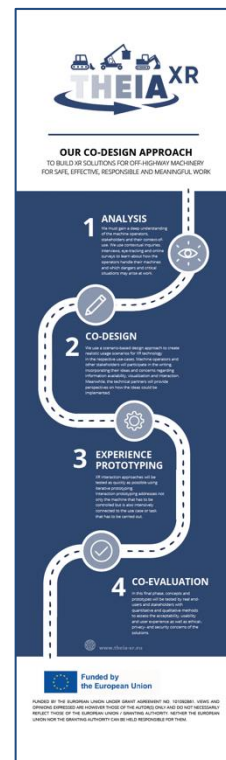


Figure 11: Roll-Up Co-Design Approach<sup>10</sup>

### Press Release

THEIA<sup>XR</sup> has published a press release at the beginning of the project and it resulted in a number of media presence as listed below:

Non-Scientific and non-peer reviewed publications (popularised publications)	
Mensch-Maschine-Interaktion in mobilen Maschinen verbessern	Hanser Automotive
TTControl to coordinate extended reality technology project	Industrial Vehicle Technology International
TTControl to coordinate extended reality technology project	Tekno Holic News
TTControl coordinates the extended reality technology project	GlobalNews Today
Enhancing conventional human-machine interfaces with XR	Smart Futures
XR VERBESSERT INTERAKTION ZWISCHEN MENSCH UND MASCHINE	New Business
Extended Reality soll Maschinen für Menschen erlebbar machen	APA Science - Austria Presse Agentur
Besser interagieren mit XR	Export (Print p. 4)
Extended Reality	New Business News (Print p. 6)
Wie Extended Reality unsichtbare Gefahren sichtbar machen kann	Kurier, Futurezone.at, msn.at (Print p. 19)
Extended reality should enable people to experience machines / Extended Reality soll Maschinen für Menschen erlebbar machen	ABA Invest in Austria, March 29, 2023

Table 2: THEIA<sup>XR</sup> media presence

<sup>9</sup> <https://zenodo.org/records/10400771>

<sup>10</sup> <https://zenodo.org/records/10400760>

## 2.2. THEIAXR Dissemination

### 2.2.1. Public Deliverables

THEIA<sup>XR</sup> produces a large number of public deliverables (see Figure 12), that, once approved, will be provided through Zenodo and spread via the already established communication channels.

Dissemination level

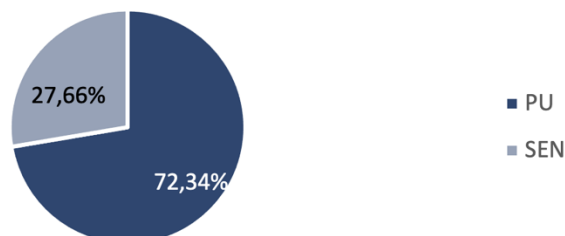


Figure 12: Dissemination level of THEIA<sup>XR</sup> deliverables

Out of a total of 33 public deliverables, 16 are already prepared and ready to be published upon approval (blue background in Table 3).

Public deliverables
Use Case Specification (first version)
Technology Analysis and Requirements Specification (first version)
HMI content list (first version)
Context-of-use Analysis (first version)
Interaction modality assignment
Interaction sequence models (first version)
Privacy Requirements
Interaction concepts (first version)
Concept of virtual user interface (first version)
Evaluation Report (first version)
Integrated THEIA <sup>XR</sup> technologies and methodologies and use case implementation (first version)
Interaction Scenarios (first version)
Deployment, testing and demonstration of the THEIA <sup>XR</sup> use cases (first version)
Prototypes for privacy-related questions (first version)
Impact activities (first version)
Design guidelines and validation reports for privacy (first version)
Use Case Specification (final version)
Context-of-use Analysis (final version)
Validation and evaluation (first version)
HMI content list (final version)
Technology Analysis and Requirements Specification (final version)
Interaction sequence models (final version)
Interaction Scenarios (final version)
Prototypes for privacy-related questions (final version)
Interaction concepts (final version)

Concept of virtual user interface (final version)
Integrated THEIA <sup>XR</sup> technologies and methodologies and use case implementation (final version)
Deployment, testing and demonstration of the THEIA <sup>XR</sup> use cases (final version)
Evaluation Report (final version)
Validation and evaluation (final version)
Privacy assessment results
XR Design guidelines
Impact activities (final version)
Design guidelines and validation reports for privacy (final version)

**Table 3: THEIA<sup>XR</sup> public deliverables**

## 2.2.2. Publications

The THEIA<sup>XR</sup> track record of scientific publications already shows a valuable number of publications in journals and conference proceedings. Below is an extract of these:

Journals / Magazines
F. Reyes-Aviles, P. Fleck, D. Schmalstieg, and C. Arth, “Bag of World Anchors for Instant Large-Scale Localization”, Transactions on Visualization and Computer Graphics (TVCG), 2023.
T. Kernbauer, P. Fleck, and C. Arth, “PanoTherm: Panoramic Thermal Imaging for Object Detection and Tracking,” in International Conference on Computer Vision Theory and Applications (VISAPP), 2024, pp. 98-109.
T. Kernbauer, M. Tschulik, P. Fleck, and C. Arth, “Spatial Augmented Reality for Heavy Machinery using Laser Projections,” in 2024 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW), 2024.
M. Stranner, P. Fleck, D. Schmalstieg, and C. Arth, “Instant Segmentation and Fitting of Excavations in Subsurface Utility Engineering,” Transactions on Visualization and Computer Graphics (TVCG), 2024.
K. Helin, A. Alesani, T. Kuula and V. Goriachev, “Early-stage user experience design of the remote operation concept of the harbour’s reachstacker by exploiting eXtended Reality”, International conference (AHFE), 2024.

**Table 4: Journals / Magazines**

Conference Proceedings
Mika Benjamin Heinemann, Thomas Kernbauer, Philipp Fleck, Clemens Arth. Spotlight Control for Real-Time Targeting. 32. International Conference in Central Europe on Computer Graphics, Visualization and Computer Vision (WSCG), ISSN 2464-4617, 2024.

**Table 5: Conference Proceedings**

It is worth to mention that already three papers in the context of THEIA<sup>XR</sup> have been recognized with “best paper awards” or “honorable mention”:

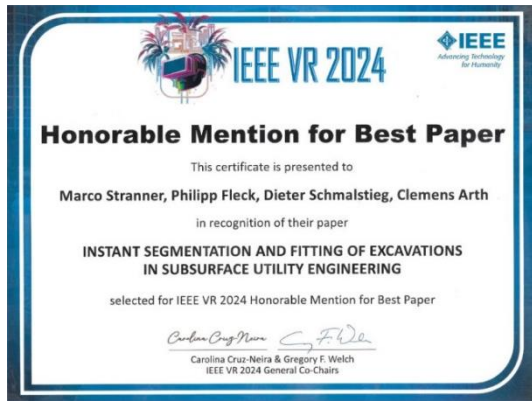


Figure 13: Best Paper - IEEE VR 2024



Figure 14: Honorable Mention XRIOS IEE VR 2024



Figure 15: Best Paper Award AHFE 2024

### 2.2.3. Events

The following chapter will give insights on the project's public appearances at the various conferences, expos and presentations that were attended and held since the project start in 2023.

#### XR Expo Stuttgart



Figure 16: Manuel Kulzer, HdM in discussion with booth visitors

In June 2023, THEIA<sup>XR</sup> had the first presence at an expo, namely the XR Expo in Stuttgart. Stuttgart Media University was organizing a booth for the THEIA<sup>XR</sup> project, and it attracted many visitors who received insights into the project and its advancements.





Figure 17: THEIA<sup>XR</sup> Stand @XR Expo

## IVT Expo and Conference



Figure 18: THEIA<sup>XR</sup> @IVT EXPO & CONFERENCE



Figure 19: TTControl Expo Stand with THEIA<sup>XR</sup> roll-up

THEIA<sup>XR</sup> was represented at the stand of the project coordinator TTControl and was hosting a full session during the conference: “Cab design, Ergonomics, Controls, HMI & Human Factors”. The following presentations have been made during this session:

- XR in the cabin – the THEIA<sup>XR</sup> approach by Martijn Rooker, TTControl
- Accurate Outdoor Augmented Reality - Applications and Challenges by Clemens Arth, TUG
- User Interface Design in industrial applications – Using low effort, medium fidelity prototyping to explore XR modalities by Sebastian Lorenz, TUD
- Exploiting XR in the novel cabin concepts and operator support by Kaj Helin, VTT
- XR use cases in container handling machines by Pekka Yli-Paunu, KALMAR



**Figure 20: THEIA<sup>XR</sup> at the IVT Session "Cab design, Ergonomics, Controls, HMI & Human Factors"**

The session was concluded by a vivid panel discussion and interesting exchange with the audience addressing numerous aspects including the social acceptance of different solutions in various scenes.

### STEREOPSISIA

Upon invitation of DG CNECT and XR4Europe, THEIA<sup>XR</sup> was part of the session "PRESENTATION OF HORIZON EUROPE & H2020 PROJECTS". Martijn Rooker presented the project and the current status of activities.



**Figure 21: Martijn Rooker during his presentation**

The session covered a wide range of projects, each targeting different aspects and use cases to be addressed with the support and further enhancement of XR solutions.



**Figure 22: Martijn Rooker presenting the THEIA<sup>XR</sup> project**

Besides the core technical topics, further very important key success criteria have been addressed and discussed:

- ethical use of XR solutions and the data generated
- privacy issues and corresponding concerns
- end user acceptance

### AGRITECHNICA

The Agritechnica proved that agriculture is another domain, where XR can play a significant role in controlling large machinery, like tractors or harvesters.

The discussions covered all from technical deep-dive on XR solutions for the cabin, testing demonstrators of various exhibitors on site and meeting project partners like Creanex on their stands.



**Figure 23: Timo Mustonen, Martijn Rooker and Gerald Fritz-Mayer meeting at the Agritechnica**

Exchange with experts at the exhibition, confirmed the demand depicted in THEIA<sup>XR</sup> and represented by the selected use cases as far-reaching and of cross-domain type as anticipated. Making the invisible visible is a topic for many types of cabins.

### **EUROXR**

Kaj Helin was presenting the THEIA<sup>XR</sup> project at the EuroXR Conference in Rotterdam. It was held at De Doelen, in Rotterdam from November 29th to December 1st 2023 and was also collocated with the Immersive Tech Week.

The presentation “Making the invisible visible for off-highway machinery by conveying extended reality technologies” was part of application track in session “Architecture, Building and Construction” and included an overview of THEIA<sup>XR</sup> project and more detailed of UI concept development of Kalmar use case.



**Figure 24: Presentation of THEIA<sup>XR</sup> at EuroXR**

### **2.2.4. Sister projects cooperation**

At the Stereopsia Conference it was also time to share best practise, exchange experience and draft plans together, when sister projects got together and the Horizon Europe and H2020 project presentation.



Figure 25: Didier Stricker, Martijn Rooker, Giuseppe Amato and Fabio Perossini

Martijn Rooker representing THEIA<sup>XR</sup>, Didier Stricker representing the [Sharespace.EU](#) project and Fabio Perossini and Giuseppe Amato for the [SUNxr.he](#) project came together to discuss the status of the activities as well as some future possible cooperation options.

As the DIDYMOS-XR project did unfortunately not have the possibility to attend the conference, the projects got to meet in early November.

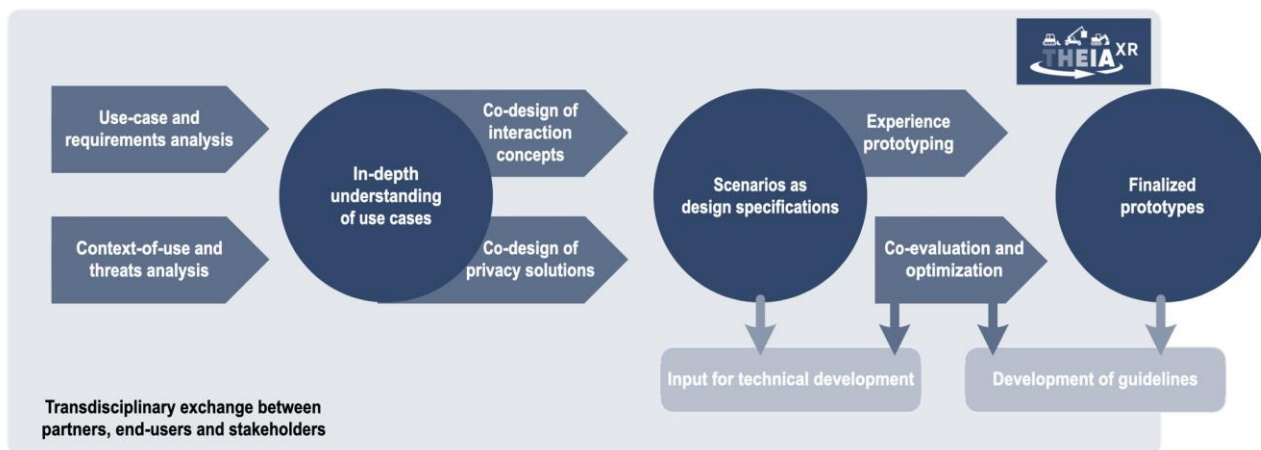
Martijn Rooker and Georg Thallinger ([DIDYMOS-XR](#)) met during an informal meeting introducing the two projects to each other, discussing the status of the project, and looking forward to potential cooperation.



Figure 26: Martijn Rooker and Georg Thallinger at their informal sister project meeting

THEIA<sup>XR</sup> is looking forward to the EuroXR 2024 in November in Athens, where the sister projects will have a joint special session.

## 2.2.5. Co-Design methodology



A further and very important vector of dissemination in THEIA<sup>XR</sup> is the co-design methodology, involving all critical user- and stakeholder groups and scientific and technical partners as experts in their respective fields. The methodology consists of four phases:

- (1) Analysis – Understanding how operators work with the vehicles
- (2) Co-Design – Developing concepts for the vehicle cabin together with operators
- (3) Experience Prototyping – Turning concepts into tangible demonstrators
- (4) Co-Evaluation – Testing demonstrators and gathering operator feedback



Figure 27: Call for Operators

Figure 27 shows the “Call for Operators” designed for the three use cases. During the co-design methodology, of course operators working at partner premises have been involved. But it is an essential element of the project to include operators outside from the project consortium. Such a cooperation has been established with the training center ÜAZ Glachau, where operators of the construction domain are trained on the machine.



Figure 28: Manuel Kulzer, HdM at the training center ÜAZ Glachau

Similar to the construction use case, for the reachstacker use case an external cooperation has been established with the operators from Hanko port, Finland.

Exchanging ideas and gathering feedback and new ideas for ideal cabin technologies of the future with the operators on the field is an essential cornerstone of the development and dissemination activities of THEIA<sup>XR</sup>.

### 3. Exploitation and Impact Creation

The following section provides an overall methodology and fundamental generic knowledge to support the exploitation of research results generated by THEIA<sup>XR</sup>. It does not intend to be exhaustive; instead, there is a stronger focus on the particular exploitation paths which are a priori more relevant for THEIA<sup>XR</sup>. In fact, exploitation work will go on along all the project duration and will be refined in the final deliverable (D7.5). Research and innovation have been placed at the centre of the Horizon Europe strategy to promote smart, sustainable, and inclusive growth. While one can debate what constitutes a healthy relation of industry and basic research, there is no doubt that a knowledge-based society prospers with the innovativeness of its engineers and the skills of its scientists. In the Horizon Europe funding program, the EC puts a focus on closely linking basic research and application, and applied research with industry, SMEs and startups. The outputs of

EU projects, being by nature strongly research oriented, are usually not ready for commercial exploitation without further work. That is why it is important to plan in advance the steps needed for making future exploitation easier.

The exploitation strategy defines application segments of the innovation, economic size of the target markets and their geographic coverage. It identifies potential users and stakeholders and sets objectives for addressing and involving them in the project. It compares their needs to the kind of problem the proposed solution solves and outlines why this solution is better than existing ones in terms of benefits to users and society at large. It talks about the knowledge (IPR) the project will generate compared to the state of the art or what is commercially available today. Finally, at the end of the project, it shall be clear which further actions shall be taken, both in terms of scientific and commercial follow-up. Options range from further internal research, collaborative research, internal product development, internal service creation, licensing, assignment, joint venture, to creating a spin-off or supporting standardization activities.

### 3.1. Overall Aim in THEIAXR

Overall objectives of the exploitation task are:

- (i) fostering exploitation by ensuring contacts to (new) stakeholders;
- (ii) identifying their needs, making sure that the project outcomes provide answers to those needs (established among others via the Co-Design approach in Work Package 3);
- (iii) identifying the potential competitive advantage of THEIA<sup>XR</sup> solutions, and finally:
- (iv) developing an exploitation plan/strategy that takes advantage of it.

The objective of this section is to provide an overview of the methodological approach for the development of the exploitation strategy throughout the project and to summarize the first exploitation activities that have taken place so far. It is basically the overall framework and basic tools to be used throughout the project to develop a sound exploitation plan.

### 3.2. Framework and Methodology

The basic framework adopted is aimed at putting in connections to project outcomes with stakeholders needs to provide the ground for the business strategy. Ensuring that project's outcomes answer specific needs of relevant stakeholders is necessary for success. Even though the methodology uses different tools or techniques to structure the information, the basic framework is built on three pillars:

- (1) project's outcomes;**
- (2) stakeholders, and;**
- (3) business strategy.**

Figure 29 depicts the pillars constituting the activities in Task 7.2. Results and outcomes are identified during the project as they are identified by partners due to their market potential. The stakeholder engagement started early in the project to gather end-user and future market needs (see Tasks 3.1 and 3.2) and this engagement will continue during the duration of THEIA<sup>XR</sup>. Finally, the third pillar on business strategies will be defined pre-dominantly when the individual results and jointly outcomes are defined.

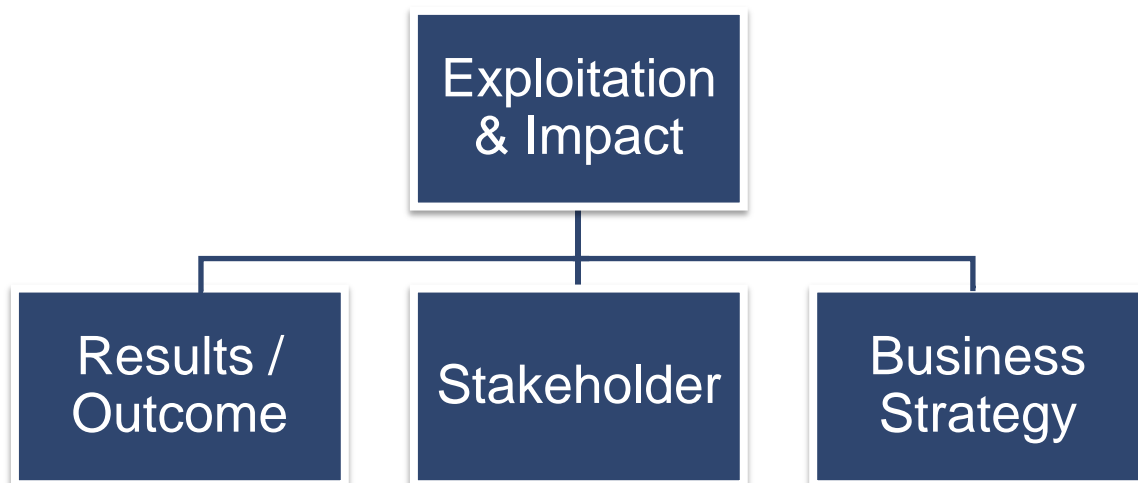


Figure 29: Major pillars used to exploit and create impact in THEIA<sup>XR</sup>

In the following paragraphs, we introduce with some more details the methodology which is then applied to THEIA<sup>XR</sup>. Important exploitation approaches and tools typically evolve from proposal to the end of the project and comprise:

- A target **Outcome Table** describing the features of the method/product/service that are the outcome of the project. Throughout the project, the comparison to the state of the art or to commercial solutions shall be further refined and target values can be compared to validated results.
- A **Stakeholder Matrix** has become the standard tool for giving a comprehensive picture of the community of researchers, potential users, buyers, and influencers in an application field. On top, this information is the basis for defining target groups in dissemination and communication planning.
- **Application Fields** shall be selected based on the above performance indicators. Selection criteria need to be disclosed and discussed. It may be recommendable to focus on two or three application areas and do a rather detailed analysis there.
- **Target Market Sectors** to clarify the market to which project's results are aimed.
- **SWOT Analysis** highlighting strengths and weaknesses of the solutions produced.
- **Lean Business Canvas** to summarize the main elements of the business strategy.

Table 6 briefly summarizes the methodology followed in the above activities.

Table 6: Methodology followed in the exploitation framework

Exploitation framework pillars	Tools	Description
Outcomes/Results (joint and individual)	Outcome Table	Identifies project's outcomes, will evolve throughout the project
Stakeholder	Matrix/Target Sector Analysis	Lists stakeholders and their perceived needs. Each need is matched with the outcome answering the need.
Business Strategy	Business Canvas	Leveraging also on information about market, the Canvas is used to put together the different components upon which business strategy is built

### 3.3. Identified Stakeholder Groups

The THEIA<sup>XR</sup> consortium identifies the following main stakeholder groups that are relevant for the exploitation of the project results (Figure 30):

- Technical & technology experts such as application developers who may build upon the THEIA<sup>XR</sup> solutions, technology service providers, that can exploit THEIA<sup>XR</sup> results for improving their services, as well as experts in standards development and open-source communities that we influence to integrate project results.
- Domain- and technology field experts including scientific and research organizations.
- End-user groups of the three use cases, i.e., machine operators, but also OEMs, manufacturers or machine vendors, and
- Business and policy makers working to either establish, or update and evolve upon their respective strategies.

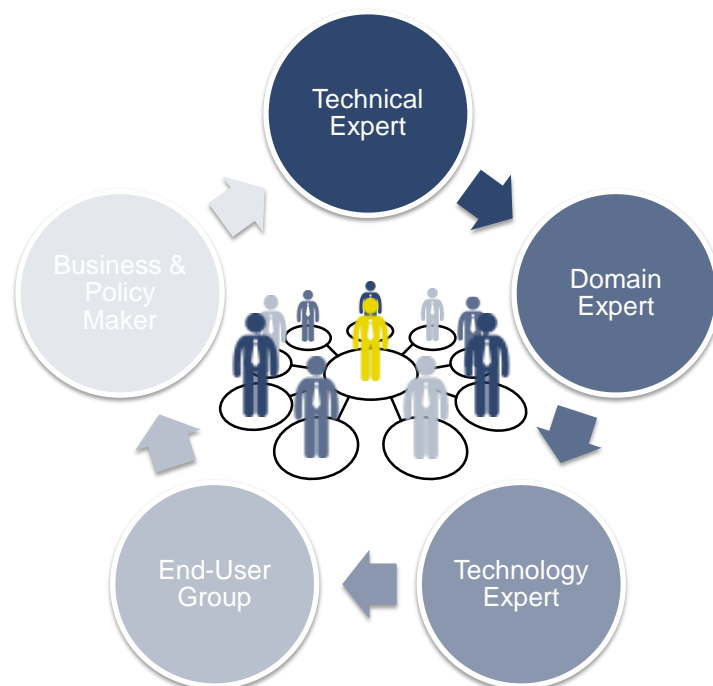


Figure 30: Identified stakeholder groups



## 4. Conclusions

This deliverable presents the overall status of the dissemination, communication and exploitation activities planned at the beginning of the THEIA<sup>XR</sup> project and those that will be carried out across the tasks T7.1 and T7.2 within the Work Package 7. Although there are task leads for the tasks T7.1 and T7.2, it doesn't mean that these partners are in charge of carrying out the activity by their own. All partners involved in the THEIA<sup>XR</sup> consortium are actively contributing to the success of the dissemination, communication, and exploitation of the project results.

The deliverable presented an overview of various dissemination activities at public, scientific, and industrial levels, along with initial results from these activities. It also showcases a selection of communication materials developed within the reporting period, such as the project website, social media channels, flyers, and roll-ups. During Task 7.1 the consortium will continue with phase two on “community outreach and result dissemination” and transition to phase three “global outreach and sustainable impact” in M25 until the end of the project. Throughout the second half of THEIA<sup>XR</sup>, additional materials will be made available for project partners to use in informing different audiences (general, industrial, and scientific) about the project and its technical outcomes. The co-design methodology will continue to engage with the end-user of the technologies developed in the project to foster the potential impact of the solutions and concepts provided in the upcoming month.

During the next activities in Task 7.2 the consortium will follow the described process and methods outlined in Chapter 3. Together with the outcomes and insights from the stakeholder engagement, further analysis of the target market the consortium will be facilitating the long-term sustainability of the THEIA<sup>XR</sup> results and outcomes. Therefore, the consortium will maintain the project's exploitation process, which will include the following aspects:

- Identifying the main individual and joint exploitable results, knowledge, products
- Estimate their potential target markets.
- Timetable for commercial use and the need/possibilities for IPR protection.
- Preparation of partners' individual exploitation plans in-line with their business/research agenda.
- Business plans for the project results that analyze and quantify financials (e.g., investments and operating costs) as well as risks and opportunities through a SWOT analysis.
- Preparatory activities for the joint exploitation, such as the establishment of exploitation and/or IPR agreements between the partners.

The final achievements of the dissemination, communication, and exploitation (i.e., impact) activities will be presented in the deliverable D7.5, which is due in Month 36 at the end of the project.

## ABBREVIATIONS / ACRONYMS

<b>DoW</b>	Description of Work
<b>EU</b>	European Union
<b>HCI</b>	Human Computer Interaction
<b>ICT</b>	Information and Communication Technology
<b>KPI</b>	Key Performance Indicator
<b>KER</b>	Key Exploitable Result
<b>OEM</b>	Original Equipment Manufacturer
<b>R&amp;I</b>	Research and Innovation
<b>RIA</b>	Research and Innovation Action
<b>SME</b>	Small and Medium Enterprise
<b>SWOT</b>	Strengths, Weaknesses, Opportunities, Threads
<b>TG</b>	Target Group
<b>XR</b>	Extended Reality