Robotics4EU

Boosting Wider Adoption of Robotics in Europe

Deliverable 5.5

Liaison with existing networks & interactive exhibition v1

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1 Executive Summary

This deliverable describes the work carried out within task 5.4 "Interactive exhibition and liaison with existing networks" within the first period of the project implementation (January 2022 – June 2022). The task is devoted to the development of the interactive itinerant exhibition and liaison with existing networks and external events.

Therefore, the report summarises the efforts made by Robotics4EU to create synergies with existing EU-funded initiatives and projects, as well as to develop the virtual exhibition introducing robotics solutions.

A virtual itinerant exhibition introducing robotics in application areas and cross-cutting topics of responsible robotics will be put together and presented at external events. It will be in a format of Virtual Gallery designed for VR headsets and will let users examine, interact and experiment with robotics solutions in application areas in a virtual space. The virtual exhibition is an innovative way to bring together different technology and robotics companies and organisations from across Europe. It's a great opportunity for people to get to know robotics, AI and other technologies. As far as we know, no other exhibition like this has been created before, and it is a great way to raise awareness. In addition, such exhibition has a useful marketing aspect for companies. A beta version of the VR Exhibition was created during the first stage of its development.

The second subtask is to create synergies with other robotics related projects (with a specific focus on CSAs in order to establish synergies and build upon previous work and networks and ongoing projects in priority areas, incl. ICT-46 RIA and IA projects). The consortium will create cross-clustering and cooperation activities with other projects in order to take advantage of already established stakeholders' networks, to validate the achieved results through the contribution of different expertise, to set up knowledge transfer processes and to provide and share inputs for future research initiatives. During the events the itinerant exhibition will be presented. Robotex will disseminate the Robotics4EU project at external events that they closely work together with such as robotics conferences Slush, Pirate Summit, Techchill, robotics competitions etc.

Through these efforts, the Project team is able to increase its cooperation with the robotics community, raise public awareness about robotics, and reduce citizens' fears of being able to use robots. Through collaboration, the community will be able to benefit from the full potential of the project.

2 Introduction

The current deliverable presents the first version of the report for all the liaison efforts carried out within work package No. 5 of the Robotics4EU project. This report summarises all the activities realised within Task 5.4 "Interactive exhibition and liaison with existing networks" led by Robotex. This task is divided into two subtasks:

- Subtask T5.4.1 Interactive itinerant exhibition. This subtask is devoted to the creation of the virtual exhibition introducing robotics solutions in various application areas and cross-cutting topics of responsible robotics.
- Subtask T5.4.2 Liaison with existing networks and external events. This subtask is focused on the establishment of synergies with EU-funded robotics projects and other stakeholders within the robotics community.

This document gives an overview of the joint efforts of all consortium members on the subtasks within eighteen months of the project (January 2022 – June 2022). Therefore, it explains a designed strategy for liaison activities and provides detailed information on collaboration and established synergies with other EU-funded projects. Lastly, it sheds light on the main aspects of the interactive virtual exhibition such as an idea, concept, and technologies and provides images of the first demo version.

2.1 About Robotics4EU

Robotics4EU aims to ensure more **widespread adoption of (AI-based) robots** in healthcare, inspection and maintenance of infrastructure, agri-food, and agile production. It will be reached through the implementation of the responsible robotics principles among the robotics community that results in **societal acceptance** of the robotics solutions in application areas. Robotics4EU will create and empower the **EU-wide responsible robotics community** representing robotics innovators from companies and academia in the fields of healthcare, inspection and maintenance of infrastructure, agri-food, and agile production as well as citizens/users and policy/decision-makers by:

1. **rising awareness about non-technological aspects of robotics** (ethics, legal, socioeconomic, data, privacy, gender) by organising community building and co-creation events bringing together the robotics community and citizens.
2. **advocating for responsible robotics among all stakeholder groups**, incl. policymakers.
3. developing **a responsible robotics maturity assessment model** and bringing the project results to the standardisation bodies.
4. reaching out to the policymakers by **compiling a responsible robotics advocacy report and organising a high-level policy debate**.
5. integrating AI4EU and Robotics4EU platforms that **enable access to technological and non-technological tools** and ensure high visibility and added value to the end-users from the robotics community.

3 Interactive Exhibition

The following section is an overview of the process of creating a VR exhibition and strategies for supplementing the exhibition and disseminating it at different events in this report.

The first version of the virtual reality exhibition was prepared by the end of June 2022 to be presented at the European Robotics Forum 2022 (ERF 2022) in Rotterdam, the Netherlands. During the forum, approximately 100 visitors tried out the virtual exhibition. It was also promoted to the technology developers as a golden opportunity to integrate their robotic solutions. On the one hand, it is a great chance for companies to get ample visibility among end-users. On the other hand, it will increase the awareness and acceptability of robots by the citizens, as well as by the robotics community.

Figure 1 A visitor trying out the VR exhibition at the Robotics4EU Booth

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Most importantly, the ERF 2022 visitors showed great enthusiasm about integrating their robots into our virtual exhibition. Overall, Robotics4EU generated more than 25 leads during the event. The ones who have clearly stated their interest in the exhibition have been already contacted. Currently, we are analysing the leads and following up on them providing the necessary information/guidelines for integrating their robots into the VR exhibition.

The ERF 2022 was a significant event for us not only in terms of the exhibition's promotion but also in terms of gathering feedback from users. The partners who worked at the booth always asked visitors if they enjoyed the experience and what could be improved. Some visitors were extremely enthusiastic about our concept, asked questions and shared their ideas about future improvements. Therefore, we collected and summarised all obtained feedback.

- Some visitors noted that some walls have way too much text. That is why the level of interactivity should be enhanced. The text can be accompanied by audio tracks to be able to listen to the same information. Also, there should be more visuals, videos and 3D models.
- It was suggested to incorporate dynamic figures of 3D models into the exhibition to make it more realistic. However, this depends on the simulations which are provided by companies, which is why it is a nice-to-have feature rather than a must-have.
- We may consider creating dedicated rooms for each of the focus areas:
  - Agri-food,
  - Healthcare,
  - Inspection and Maintenance of infrastructures
  - Agile production

- For these focus areas, we may gamify the rooms by creating related background images and sounds, like a crop field for agri-food, a hospital or similar for healthcare etc.

3.1   Idea

It was the consortium's vision to make innovations in the field of robotics available to everyone in a virtual reality format. The exhibition provides a great opportunity to draw many companies developing technologies to one platform and provide the most engaging experience to the citizens.

On the one hand, everyone can be introduced to the different robotics and technology companies operating in Europe, allowing them exposure they would not otherwise have had. By visiting the exhibition, members of the community can also get to know other members and their products and services. This, in turn, provides a good opportunity to initiate various collaborations.

On the other hand, by taking part, companies will get a great opportunity to promote themselves and attract new business partners, as the exhibition will be introduced at different innovation, technology, and robotic events around Europe. Also, the exhibition will be available on AI-on-Demand platform to attract more visitors.

Having the VR exhibition at events was proven to be a great way to build trust and capture the robotic community's interest. Furthermore, it does not have the same logistical demands or complications that a physical presence at an event would have for companies, as sending robotic solutions to each event's place of venue might be complex and discourage these companies from participating.

Furthermore, the feedback obtained so far from the companies present in the VR exhibition displayed in the ERF 2022 is that the added value of this initiative for them is great, does not require a great effort on their part and has brought good results.

With regard to the companies chosen, there was no specific criterion for selecting them, as our aim is to reach as many businesses and organisations belonging to the four

sectors covered in the project as possible: healthcare, agri-food, inspection and maintenance of infrastructures and agile production.

3.2 Technology

The Virtual reality headset displays are based on technology developed for smartphones, which includes gyroscopes and motion sensors for tracking positions of the head and hands, small HD screens for stereoscopic displays, and small, lightweight processors. Thanks to these components, independent VR developers were able to develop headsets at relative affordability. For this virtual exhibition, we use the Meta Quest 2 VR headset.

Meta Quest 2 is a virtual reality (VR) headset developed by Facebook Reality Labs (formerly Oculus). It is a successor to the company's previous headset, the Oculus Quest. It is an updated version of the original Oculus Quest with a similar design, but with a lighter weight and updated internal specifications. A display has a higher refresh rate and per-eye resolution, and Oculus Touch controllers are easier to manage.

3.3 Concept

Given the nature and purpose of this project, the idea was to create a virtual exhibition to give people visiting the exhibition a comfortable and friendly understanding of robotics and, if possible, its specificity. Hundreds of different robotic and AI solutions are being developed in different countries and organizations in Europe, of which the average person has no idea. The idea behind the virtual exhibition is to bring together as many different European robotics and technology companies as possible to raise their profile. Because it is practically impossible to physically bring together all the different robotic solutions, the virtual exhibition will provide a suitable and convenient way for visitors to get to know them.

To make the exhibition more accessible for target groups, it has been designed to be multifaceted. Therefore, visitors can experience it in two formats: through a VR headset and in 2D through the browser. The first option allows users to get a more realistic feeling and examine all the robotics models in detail.

The exhibition includes text information, videos, presentations, and 3D models of robots available for visitors to be explored. In the future, different technological fields will correspond to rooms of the exhibition, e.g., "smart city", "education", "healthcare" and "industry".

3.4 Technical development

The virtual exhibition is created and developed in collaboration with professionals at Estonia's top university, the XR centre. We contacted multiple service providers which offered different implementation strategies, but the XR centre was chosen because their ideas corresponded with our vision and the high-quality work they provide.

To gain a sense of the exhibition's potential and how visitors would view it, we created a rudimentary version of the exhibition. After making a few minor changes, we began the work.

3.5   Companies selected

We planned to contact about 60 European robotics and technology companies that develop an actual physical product. These companies were provided by each partner from their specific countries. In addition, we have searched for other European robotic projects and institutions.

However, only a few of them provided positive feedback and some of them agreed to participate next year (Annex 1). This means that currently we have 4 different exhibits in the virtual exhibition. All of them are deeply linked with the United Nations' Sustainable Development Goals (SGDs), since Robotics4EU tackles the issue of responsible robotics and their societal values. In this sense, it is important to understand how this project and, in turn, the companies cooperating with it, are linked to the specific objectives of the United Nations that will ensure a future of peace and prosperity for the planet:

Company name	Description	SDG to which it is linked
Starship Technologies	Starship Technologies uses autonomous robots to revolutionise local delivery. It develops food and package delivery services that improve everyday life.	Goal 9 - Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. Goal 8 - Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
Cuploop	It develops automated collection and deposit refunds for reusable packages.	Goal 12 - Ensure sustainable consumption and production patterns. Goal 13 - Take urgent action to combat climate change and its impacts. Goal 11 - Make cities and human settlements inclusive, safe, resilient and sustainable.
Milrem Robotics	It provides innovative robotics solutions for challenging environments, i.e. robotics solutions that increase human	Goal 9 - Build resilient infrastructure, promote inclusive and sustainable industrialization and foster

	safety and labour efficiency in defence, agriculture, forestry, municipal services, rescue and mining.	innovation.
Cleveron Mobility AS	It develops and manufactures vehicles that save energy, are environmentally friendly and contribute towards a climate-neutral economy, i.e. the self-driving delivery vehicles adaptable to size and type of transported items.	Goal 9 - Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. Goal 13 - Take urgent action to combat climate change and its impacts. Goal 8 - Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

Table 1 Companies in the VR exhibition and their linked SDGs

The main bottleneck to getting the companies we contacted in the first place was the lack of credibility. Robotex had already had previous communication and cooperation with existing exhibitors. That is why, in the first version of the exhibition, only a few Estonian and international companies display their products. The companies, especially the smaller ones, have some concerns about sharing technological innovations with a wider audience. But to resolve this limitation we give opportunity for organisations to provide and share simple public materials with us.

Since the number of companies is still small, we will start a new round of contacts, following a well defined strategy:

1. Searching for suitable companies that have robotics-related products or services.
2. Sending the first introduction email, with a short introduction about what R4EU project is, why we would like to involve them and what is this initiative's added value.
3. If we have no answers, we try to contact these companies or ask the partners from the respective country to do that.
4. If we still have no answers, we send a follow-up email.
5. If they answer, we clarify any possible doubts and introduce more details about the VR exhibition and how it is going to be used.
6. If they are interested, we send another email with the requirements and criteria for the materials we need to include in the exhibition, and in which formats.
7. Once we receive the materials, we incorporate them in the VR exhibition (more about the technical development in Section 4.4).

These companies will be not only the ones already identified and contacted, but also the leads resulting from the ERF 2022 that have shown interest in being part of the VR Exhibition

These are presented in the Annex 7.

For the next release, we intend to incorporate approximately twenty European companies into the exhibition.

3.6 How to visit

In the future, several ways to access the exhibition will be available to the general public and the robotics community. First, it will be integrated into the R4EU website and AIoD platform. Second, we will present it at international robotics, technological, and innovation events in 2023. Below is a table which shows potential events in 2023 where we can promote our exhibition.

Name	Place	Date
LOGIN 2023	Vilnius, Lithuania	To be determined
Industry 4.0 (2023)	Vilnius, Lithuania	To be determined
SPRINT Robotics World Conference for Inspection & Maintenance 2023	Houston, Texas, USA	To be determined
Maker Faire 2023	Lille, France	To be determined
International Conference on Healthcare Robotics and Therapeutic Robots 2023	Rome, Italy	February 20-21
Streering committe METRICS 2023	In RTX premises in Tallinn	March 8-9
18th Annual ACM/IEEE International Conference on Human Robot Interaction (HRI) 2023	Stockholm, Sweden	March 13 - 16
sTARTUp Day 2023	Tartu, Estonia	March 14 - 17
Maker Faire 2023	Gent, The Netherlands	April 28-30 (Gent)

TechChill Riga 2023	Riga, Latvia	April 27- 28
Warsaw Industry Automatica - 2th Edition 2023	Warsaw, Poland	May 9-11
The 19th IEEE International Conference on Advanced Robotics and Its Social Impacts (ARSO 2023)	Berlin, Germany	June 5-7
South Summit Madrid 2023	Madrid, Spain	June 7 - 9
Viva Technology 2023	Paris, France	June 14 - 17
ICRA 2023	London, UK	May 29 – June 6
Science Festival (French event) 2023	In LNE's premises	October 10th
Web Summit 2023	Lisbon, Portugal	November 13 - 16
Robotex International 2023	Tallinn, Estonia	November 17 - 18

Table 2 . Potential events for introducing the VR exhibition.

3.7   Work performed

Before starting the development process, we had to think about the following questions:

- Accessibility of the platform. e.g., though both a standard PC browser and VR, the recommendation to Oculus Quest and Open VR must be supported.
- Functionality of the platform. What needs to be done, so that users could move in the space and view visuals and 3D models? Is there a need for online chat, entertaining games in VR space, etc.?
- The design of the platform space. Should it be pre-determined or of a free choice?
- Content. How much and what kind of content is to be added to the platform (e.g., how many videos and their duration? How many models and how many polygons should we have? Should the models be animated/ interactive?
- Testing the sample packages. Should we try out some sample packages (text, images, video, 3d models, etc.) for the very first version?

Currently, four Estonian robotics companies are exhibiting their equipment via 3D models: Cuploop, Milrem AS, Starship, and Cleveron Mobility AS. More detailed information about these robots is presented in the Annex. Furthermore, the exhibition features information about the consortium organizations of Robotics4EU, as well as information about the project itself. The first version is going to be updated later this year and enriched by models of interested companies (potential leads).

3.8 First demo version
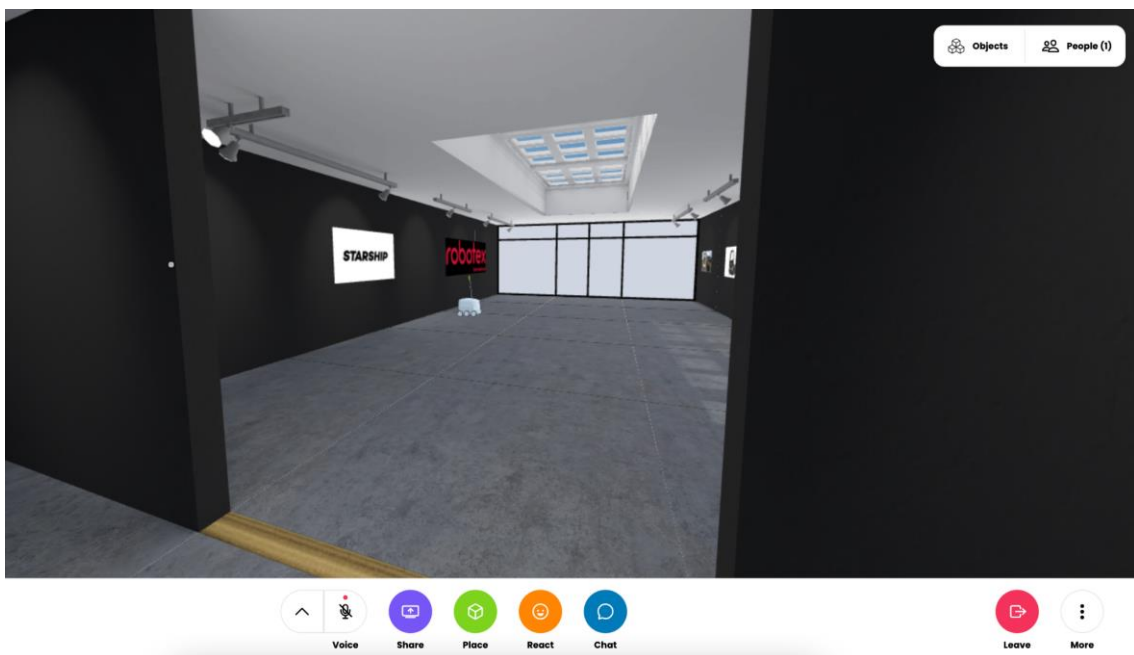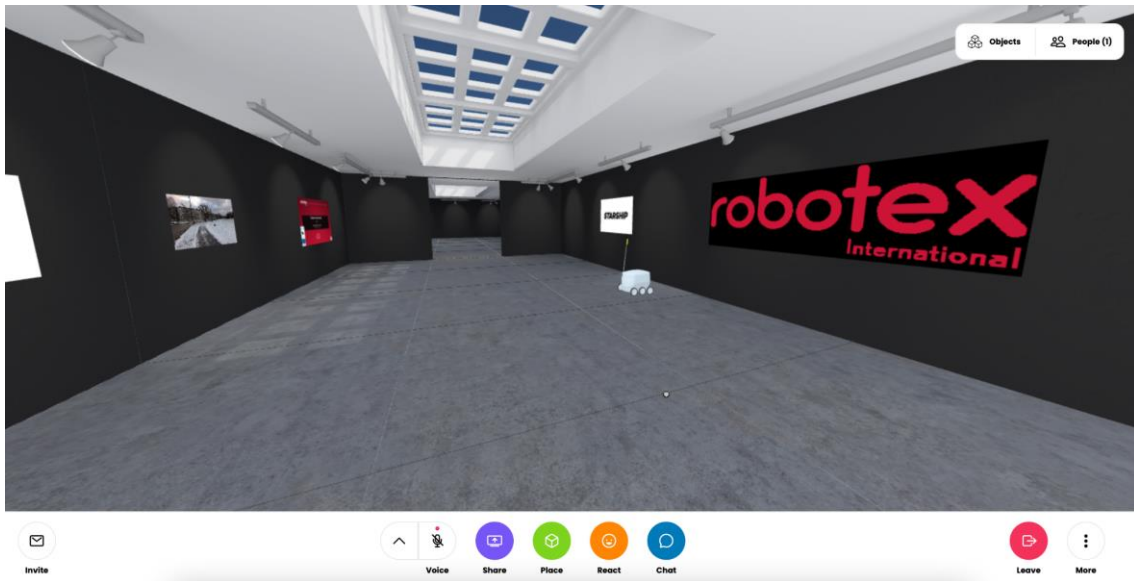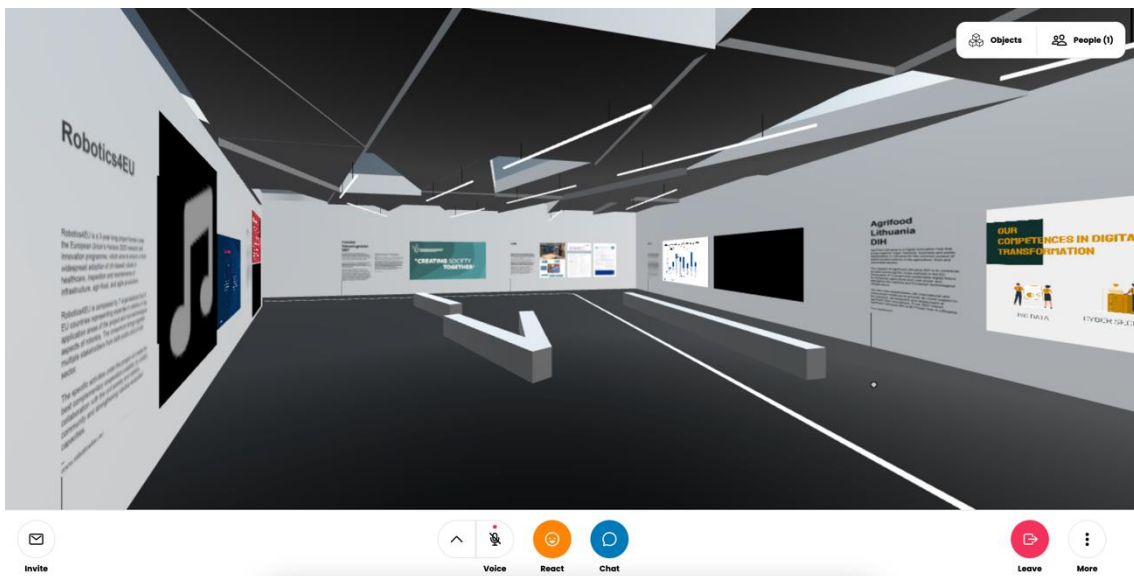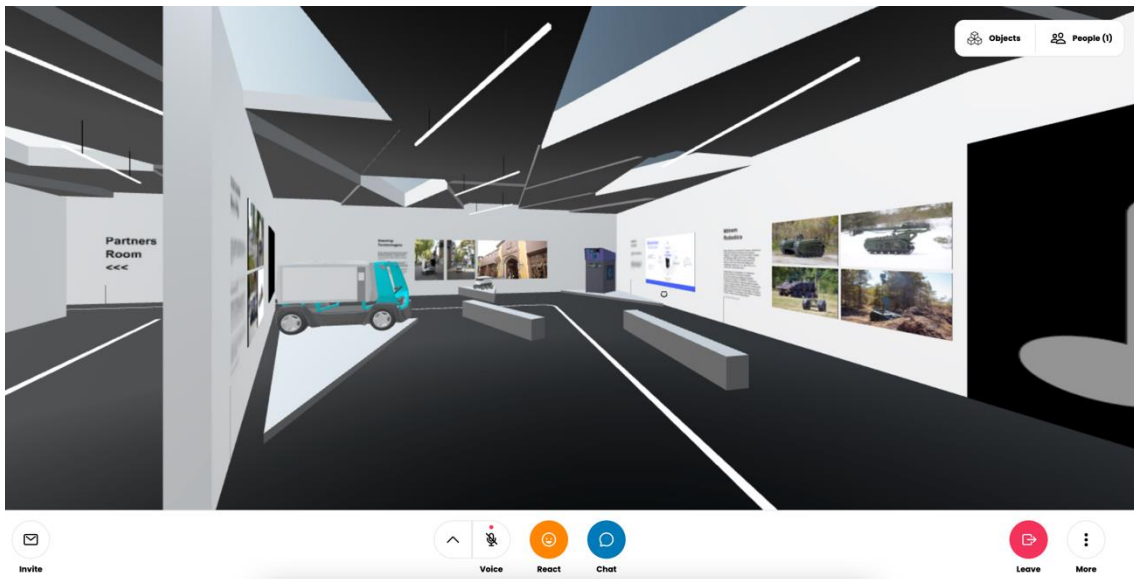
3.9 User Guide

Robotex will develop a User Guide to be used by partners who want to show the VR exhibition in the events where they are present.

This User Guide will have developed the following steps:

1. If possible, you need an Oculus Quest 2 headset to join the exhibition in the place of the venue.
2. If you have a booth at the event, it is better to use VR glasses if possible so that people can experience it.
3. If using the glasses, you need to set up a place and area around you where you can use them all the time in the same place. Otherwise, you need to do the setup repeatedly when you want to use it. Also, a WIFI connection is needed.
4. You log in through the glasses here: https://hub.link/rGheiJT
5. Log in with the join code that you can get from the link, and you are good to go and explore the exhibition.

6. Another option is to use it in the desktop version (2D, without glasses) from the shared hub.link link or from the integrated version from Robotex webpage: https://robotex.international/r4eu-vr/

3.10 Next steps

● Companies contact: The consortium will be contacting the potential leads made on the ERF2022 to gather new 3D models, as well as the companies already identified and contacted.
● Future improvements: The exhibition will be updated with new models, as well as the gathered feedback will be analysed to make the exhibition more user-friendly.
● Integration: After the next release, the exhibition will be connected to the AI-on-Demand platform, so that it can also be viewed through a PC in 2D format.
● Promotion at the physical events: The Robotics4EU's consortium will attend relevant conferences and exhibitions to promote the project and the Virtual Reality exhibition. Also, this is crucial for attracting more technology developers aboard.

Communication: There will be the continuous promotion of the exhibition through social networks, newsletters, press releases, the R4EU website and the AI-on-Demand platform.

4 Liaison with existing networks and external events

During the first period, Robotics4EU's consortium was involved in many tasks, such as robotics community needs analyses, citizen consultations, organisation of workshops, robotics ideas and solutions validation, exhibition preparation, dissemination and communication activities. As a result, all consortium partners established individual contacts with other EU-funded projects and initiatives, as well as with representatives of the robotics community in academia and industry at the EU level.

Therefore, as part of Task 5.4.2 "Liaison with existing networks and external events", Robotics4EU accomplished the following steps:

- Creation of a strategy for liaison activities;
- Mapping out the existing networks;
- Creation of synergies among the EU-funded R&D projects and initiatives and other related tech communities.

4.1 Strategy for networking and community building process

Efficient community building and communication during the Robotics4EU project ensure the success of the project in both the short-term and long-term. Therefore, promotion, dissemination, stakeholders' engagement and liaison activities are central to the Robotic4EU efforts throughout the implementation period.

4.1.1 Main principles that underlie the strategy

The strategy for liaison is built on the following principles which guide the consortium members:

- Proactiveness. This principle is about taking an active role in building the robotics community in the EU. Instead of waiting for others to connect to us, we reach out and initiate collaboration when needed. That is why we try to be present at large-scale physical and online robotics events where we can reach more people. We also take responsibility for our actions and try to do our best to accomplish what was promised.
- Openness. It means that we are open to initiatives of other projects and try to do our best to take chances to increase our visibility. This also includes our eagerness to present our project at external events when there is a great opportunity to do so.
- Making use of existing resources. The organisations in the consortium have already had some experience of participation in the EU-funded projects and various technological events related to our focus areas. Therefore, we committed to using our existing professional networks (including our personal networks) in order to find individuals with relevant expertise for specific project activities.
- Personalised approach and respect for stakeholders. We value the personalised approach over the generic one. That is why we prefer sending personalised emails and reminders when possible. For example, we had bilateral meetings

with speakers presenting at our workshops to make sure they are on track with the agenda and understand how to use the proposed software. Also, we strongly support the privacy of our connections and follow the ethical requirements which were formulated at the beginning of the project (D7.1 and D7.2)

4.1.2   Robotics4EU's Approach

The Robotic4EU project is committed to defining, planning, organising a rich set of activities and exploiting relevant instruments in the most effective way towards building a strong and vibrant robotics community in the EU that will make a difference. Therefore, the project liaison with existing networks follows a three-stage approach to outreach and impact creation, as shown in the chart below.
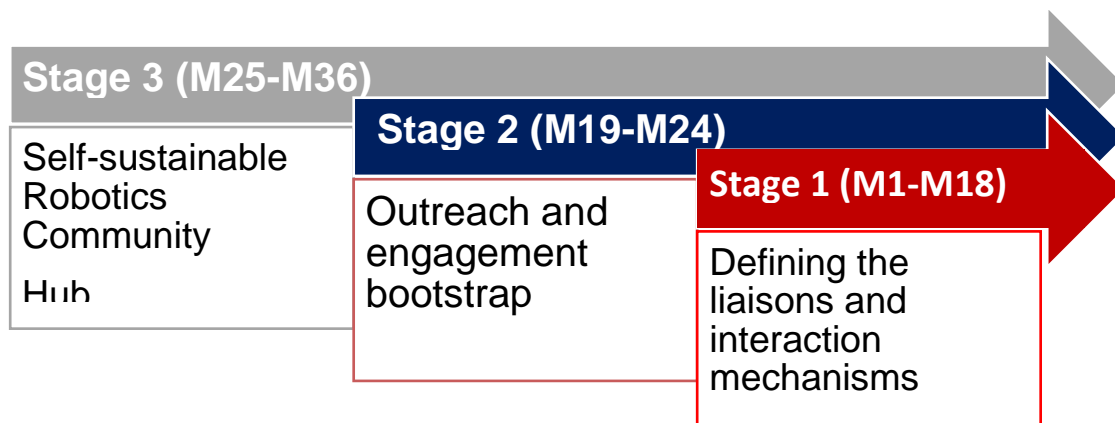
Stage 3 (M25-M36)

Self-sustainable Robotics Community Hub

Stage 2 (M19-M24)

Outreach and engagement bootstrap

Stage 1 (M1-M18)

Defining the liaisons and interaction mechanisms

Figure 2 Stages of the community-building process.

As part of the community-building process, it is imperative to remove existing barriers and establish a relationship of trust among the members of the robotics community. Collaboration of different community stakeholders will lead to the creation of common bonds in the community. As its members exchange knowledge, discuss results and help each other achieve goals, the groups within the community transcend their own differences. The second step is related to increasing the outreach and developing a sense of belonging to the community, while the third step is making the established community sustainable.

Stage 1. Defining the liaison and interaction mechanisms

During the first phase, we have designed the liaison and communication strategy. We have identified target groups, planned activities and selected dedicated communication tools and community-building activities. As a result, we have begun defining interaction mechanisms with the robotics community including relevant research and development projects (more detailed information is provided in 3.3 Creating synergies with other EU-funded projects and initiatives).

Stage 2. Outreach and engagement bootstrap

This stage is about the active engagement of identified stakeholders, using the established mechanisms and the designed strategy. At this stage, the outreach should be larger to establish new contacts and the existing synergies should be more beneficial. The active engagement also considers the presence of Robotics4EU at significant networking events and conferences for the EU robotics community. The level of involvement in the different events and activities will vary, according to the nature and scope of the event. We will choose the ones which are "tailored" for the project's dissemination goals, giving a clear priority to the events organised by the EC**.**

In addition, we will make sure to update the news section on our website and the social network channels to highlight all the necessary events attended by partners. This will increase our online presence and may increase the outreach.

Stage 3. AIonDemand (AIOD)

Cooperation wit AIonDemand platform is developed under the WP2. The European AI-on-demand (AIOD) platform seeks to bring together the AI community while promoting European values. The platform is a facilitator of knowledge transfer from research to multiple business domains. Cooperation between Robotics4EU and AIonDemand involves projects, organisations and individuals that are working towards making robotics more responsible. The integrated robotics community, which is the result of collaboration among different projects, needs to be supported in order to stay alive. Mainly, the events of the last stage are aimed at maintaining the established relationships.

4.2   Mapping out the existing networks within the EU robotics community

To maximise its impact, increase synergies and avoid technological overlaps, Robotic4EU has started building a network of existing initiatives and projects in the field of robotics. For this purpose, the consortium mapped out various representatives of the robotics community and established a connection with them. As result, the database of representatives of projects, academia, and industry has increased over time and currently comprises more than 800 contacts[1].

The mapping was structured as follows:

- Projects funded under ICT-46-2020 (12 projects);
- Other robotics projects with whom Robotics4EU partners have established relations (more than 20 projects);
- AI4EU network (90 projects);
- Digital Innovation Hubs (DIHs);
- Other stakeholders engaged in Robotics4EU activities.

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[1] As this is a public deliverable, due to the confidentiality and GDPR requirements the document with contacts will not be included in this deliverable.

4.3   Creating synergies with other EU-funded projects and initiatives

The European Commission is committed to enabling and accelerating the wide adoption of European technologies, showing clear benefits in particular applications coming from major industrial sectors, contributing to their competitiveness, quality of service, and sustainability strategy.

4.3.1   Collaboration with the AI-on-Demand platform

There is a need to provide industry with more autonomous, intuitive, and easier-to-operate technologies that are trustworthy and tailored for their needs, with the adapted and guaranteed levels of performance, reliability, safety, dependability, security, and transparency. Delivering AI solutions that combine data from a variety of sources, sensors, interactions, and information to address industrial challenges.

The majority of robots are not intelligent. However, companies are no longer just interested in automating certain processes but are also interested in intelligent automation. There is a clear trend towards mobile, autonomous robots that are able to intelligently collect, process, and manage data. This is in terms of manufacturing or production. The technology used to power robots that employ artificial intelligence is augmented with a variety of sensors, including vision devices such as 2D/3D cameras, vibration sensors, proximity sensors, accelerometers, and other environmental sensors, that feed them with data they can analyze and act upon in real-time. In combination with artificial intelligence, robots have the potential to revolutionize business operations and lead to innovation.

The European Commission called a meeting on the 21st of June 2022. Projects whose exploitable assets include online platforms were invited to discuss the main challenges of the AI-on-Demand platform presented below in the table.

Challenge	Descriptions
Strategic cooperation	• Can the AI on Demand platform be made attractive to the robotics community? • How can the AI on Demand platform be enhanced to facilitate contributions and active engagement from robotics practitioners and projects?
Operational integration	• In terms of content and services, how are the various platforms positioned? • Are there any potential integration layers between the various platforms? • What can be done to improve coordination between projects?
Sustainability	• The sustainability plans of the project extend beyond its lifespan.

Table 3 Challenges of AI-on-Demand platform.

As a result of the meeting, the projects' representatives agreed to share their vision on how to connect their platforms with the AI4EU platform within 2-3 months.

Initially, it was envisioned for the Robotics4EU project to develop a user interface to be built on top of the AI4EU own infrastructure.

However, when we started with this process, the AI4EU project came to an end and we came to a conclusion that full integration of the two platforms wouldn't be possible. Because of that, the consortium decided on moving forward with a stand-alone platform that would replace the Robotics4EU institutional website. From that point, our strategy was to make the Robospot platform an independent source from the Robotics4eu website, serving as a responsible robotics virtual knowledge hub that it could function after the end of the project.

Since the AI4EU platform, now AI-on-Demand, is being supported by the AI4Europe project from July 2022, the Robotics4EU consortium reconsidered the possibility of integrating Robospot contents, assets, tools and functionalities into the AIoD platform. As such, Robospot will cease to exist once this transition is made. At this moment, a strategy for contacting the AI4Europe consortium and integrating it with the AIoD platform is being set up in order to speed up this transfer.

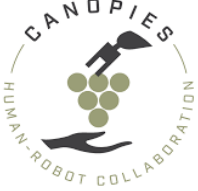### 4.3.2 Collaboration with ICT-46-2020 projects

Robotics4EU has initiated the collaboration with other projects funded under ICT-46-2020: Robotics in Application Areas and Coordination and Support. First, we did research mapping out necessary contacts and after contacting each coordinator organised an online call. This online meeting aimed to:

- understand the mid-term results of all projects;
- deepen the understanding of how non-technological aspects (ethics, data protection, cybersecurity, socio-economic issues) of robotics are considered in the projects;
- identify common topics for further collaboration between RIAs and IAs and between all projects and Robotics4EU;
- identify the results that can be disseminated and communicated by Robotics4EU.

In total, representatives of 10 projects attended the meeting. These projects are presented in the table below.

Project	Objectives	Duration
FLEXIGROBOTS	FlexiGrobots is an Innovation Action aiming to build a platform for flexible heterogeneous multi-robot systems for intelligent automation of precision agriculture operations, providing multiple benefits to farmers around the world	1 Jan 2021 – 31 Dec 2023
CoRoSect	CoRoSect is developing a novel Cognitive Robotic System for	1 Jan 2021 –

CoRoSect	Digitalized and Networked (Automated) Insect Farms. We bring leading-edge robotics, AI, and some of the best experts in our industry - to help embrace automation and wave goodbye to monotonous and mundane tasks.	31 Dec 2023
ROBS4CROP	Robs4Crops focuses on the most demanding and repetitive field operations, specifically mechanical weed control and spraying against pests and diseases. The new flexible and modular systems will greatly reduce the dependency on hired labour, increase safety, and be more environmentally friendly	1 Jan 2021 – 31 Dec 2024
CANOPIES	The main scientific objectives of CANOPIES are to develop novel human-robot interactions (HRI), human-robot collaboration (HRC) and multi-robot coordination (MRC) methodologies for implementing an effective collaborative paradigm between human workers and multi-robot teams for the precision farming of permanents crops to be validated in the context of the table-grape vineyards	1 Jan 2021 – 31 Dec 2024
DrapeBot	The EU-funded DrapeBot project plans to demonstrate a human-robot collaborative draping process. In this concept, a robot assists in the transport of large material patches and drapes the areas of low curvature, while the human deals with high-curvature regions. For efficient human-robot collaboration, DrapeBot will develop a gripper system with integrated instrumentation, AI-driven perception and task planning models, and a low-level control structure.	1 Jan 2021 – 31 Dec 2024
ACROBA	ACROBA project aims to develop a groundbreaking concept of scalable cognitive robotics platforms to revolutionise industrial production. It will achieve this through the use of cutting-edge technology and the application of agile manufacturing principles. This will enable the rapid reconfiguration of robotics production platforms, allowing the implementation	1 Jan 2021 – 31 Dec 2024

ACROBA	of advanced, cost-effective robotics solutions in small- and large-scale industrial applications	
ODIN	ODIN project aims to strengthen the EU production companies' trust in utilizing advanced robotics.	1 Jan 2021 – 31 Dec 2024
TraceBot	The objective of TraceBot is to bring verifiable actions to robot manipulation by reasoning over sensor-actor trails in a traceability framework based on digital-twin technology and extend current robot motion planners with the automatic execution of self-checking procedures that create a semantic trace of the actions performed	Jan 2021 – Mar 2025
SESAME	SESAME develops multi-robot systems which are capable of operating dependably in open configurations and in conditions of uncertainty that include the possibility of cyber-attacks.	1 Jan 2021 – 31 Dec 2023
DARKO	DARKO sets out to realize a new generation of agile production robots that have energy-efficient elastic actuators to execute highly dynamic motions; are able to operate safely within unknown, changing environments; are easy (cost-efficient) to deploy; have predictive planning capabilities to decide for most efficient actions while limiting associated risks; and are aware of humans and their intentions to smoothly and intuitively interact with them.	1 Jan 2021 – June 2025

Table 4 Projects funded under ICT-46-2020 Call.

As a result of the online collaborative meeting, it was agreed on the following points:

- The meetings among the ICT-46-2020 projects will take place every 6 months,
- A mailing list of the coordinators and dissemination leaders will be established and contacts with scientific staff will be collected to enable collaboration.

Importantly, during the call, all projects presented their vision and ideas for joint dissemination activities. Further activities will be done to deepen the collaboration among all projects and Robotics4EU. The FELICE (manufacturing) and HARMONY (healthcare) projects which were not present at the online meeting, will also be included in further communication.

To maximise the collaboration efforts, Robotics4EU organised the physical meeting on the 28th of June with representatives of those projects who attended the European Robotics Forum 2022 in Rotterdam. These include SESAME, TraceBot, ACROBA, DrapeBot, and FELICE. It was a great opportunity for attendees to learn more about each other's projects, discuss technical details in-depth and see potential to collaborate. Some participants pointed out the eagerness to cross-disseminate announcements in the social networks, take part in the events and workshops of others, and help with showcasing developed robotic solutions.

4.3.3   Robotics4EU in the TechEthos cluster

During the first period, Robotics4EU was involved in the activities of the TechEthos Cluster which is a cluster of related EU-funded projects working in the field of Research Ethics and/or emerging technologies. Various EU-funded projects address the development of new and emerging technologies, as well as the benefits and challenges they bring to society. Such projects have unique objectives, target groups and methods, but also similarities and overlapping tasks. Identifying these overlaps and fostering synergies between EU-funded projects, networks and initiatives is crucial nowadays.

Therefore, the Horizon 2020-funded TechEthos project (Grant Agreement No. 101006249), initiated a cluster bringing together EU-funded projects that dedicate (part of) their activities to research ethics and research integrity related to emerging technologies. The cluster comprises projects focused on three technology families: Climate Engineering (interaction with the planet), Digital Extended Reality (interaction with the digital world), and Neurotechnology (interaction with the human body). The table below shows all the projects comprising the TechEthos Cluster, their websites and the aforementioned focus areas (CE, NT, XR, and All) they belong to.

Project	Objectives	Focus area
TechEthos	https://www.techethos.eu/	All
SYNCH	https://synch.eucoord2020.com/	NT
NIMA	https://nima-project.eu/	NT
CONBOTS	https://www.conbots.eu/	NT
B-CRATOS	https://www.b-cratos.eu/objectives/	NT or XR
DARLENE	https://www.darleneproject.eu/	XR
ASSISTANCE	https://assistance-project.eu/	XR
STARLIGHT	https://cordis.europa.eu/project/id/101021797/de	XR

FLEXIGROBOTS	https://flexigrobots-h2020.eu	XR
pop AI	https://www.pop-ai.eu/	XR
GENIE	https://genie-erc.github.io/	CE
HR-Recycler	https://www.hr-recycler.eu/	CE
Co-Change / AIT AI Ethics Lab	https://cochangeproject.eu	All (RRI)
HYBRIDA	https://hybrida-project.eu/	All
Robotics4EU	https://www.robotics4eu.eu/	All
XR4HUMAN	No website yet. The project starts in November 2022. Information is here.	XR

Table 5 Composition of the TechEthos cluster.

Although the focus areas of the cluster do not overlap with the Robotics4EU, we are part of the cluster due to the linkage to the non-technological aspects of technologies.

This cluster meets regularly starting from February 2022 to exchange experiences and knowledge, align future plans and act in synergy for activities and events, and prepare position papers concerning the technologies relevant to the projects.

The contact person of Robotics4EU in the cluster is the coordinator Anneli Roose who has attended all meetings organised so far: the cluster kick-off meeting on 4 March 2022 and the on-site meeting in Vienna on May 23rd 2022.

During the on-site meeting in Vienna, the project representatives discussed in a world cafe session how the cluster can work together on ethical, societal, and legal/regulatory challenges. Some of the main results of the discussion are:

- Many projects are interested in exchanging information on the development of ethical frameworks. The very first step could be a working group on ALTAI, the Assessment List for Trustworthy Artificial Intelligence (ALTAI) for self-assessment.
- The cluster agreed on working together in preparing workshops and position papers.

A meeting among various Horizon program robotics projects and developers of the AI4EU platform was held on the 21st of June as the initiative of the European Commission. All together we discussed how to improve cooperation among the AI and robotics communities which will, in turn, contribute to the widescale impact of each initiative.

Below is a table which shows existing and further cooperation by a partner.

Name of the project or network and description of the collaboration
CIVITTA (CE)
RIMA Network, AI4EU, RODIN, I4MS, Atlantis, euRobotics
Representatives of these projects and networks were presenting their expertise at the series of workshops organised by CE. The future collaboration includes similar participation at each other's events, spreading words about our projects, attending official events within the robotics community, and coordinating mutual efforts on the popularisation of robotics within society.
Robohub
Robohub reached us proposing to feature our workshops on their website. Therefore, we have published three articles which introduce various topics discussed at the workshops. We envisage similar cooperation in the future by covering activities, events and deliverables of Robotics4EU which may be of their interest.
GLOBAZ S.A. (LOBA)
ICT-46-2020 projects
LOBA has created a mailing list with the coordinators and dissemination leaders of these projects. LOBA sends invitations to events, newsletters, etc. to this mailing list
METRICS, LIFEBOTS, Trinity, Rodin, INBOTS, Agrobofood, Terrinet, DIH2, Corosect, OpenDR, ShareWork, Sherlock, DEEPFIELD, I.AM., ESMERA, BACCHUS, SOFTMANBOT, TechEthos, RIMA, DIH-HERO, etc.
LOBA manages the social media channels of the project, and daily interacts with the channels of these projects, sharing their content and engaging with them.
(LNE)
H2020 METRICS
As project leader of METRICS, LNE ensures a link between the networks and activities of the two projects. The relationship consists of information transfer of each project's events and activities in order to leverage the networks of all the partners involved; both projects focus on the same 4 priority areas (I&M, agrifood, healthcare and agile production), but the partners represent slightly different disciplines in these domains. The exchange of information ensures an extended coverage of the community. Since METRICS holds a task on the acceptability of robotics (METRICS T2.3), the task leader is an invited speaker for the high-level stakeholder forum in August (Robotics4EU T3.5).

Danish Board of Technology Foundation (DBT)

SocKETs

The collaboration is in process. Robotics4EU has been selected to share our work with societal engagement in T4.1. SocKETs aims at developing a shared understanding of the role of key enabling technologies in society and advocating for the importance of societal engagement in the innovation process. To do so, SocKETs will gather and highlight 'Societal Engagement Stories' on experiences with societal engagement and emerging technologies or social challenges. 6 stories will be selected and published on the SocKETs website: www.sockets-cocreation.eu. The stories selected will benefit from a large European exposure and mediatisation and will be supported by science communication professionals, from Ecsite.

Canopies and further ICT-46-2020 projects

DBT reached out to the Canopies project and/or one of the other ICT-46-2020 projects to include their robotic solution in task 4.2. Contact has been made and interest has been shown. Final confirmation of the future collaboration will be done after the summer holidays.

Norges Teknisk-Naturvitenskapelige Universitet (NTNU)*

LIFEBOTS

H2020 MSCA-RISE, project number 824047, is creating a network of SMEs and research institutions working on social robotics and healthcare. Diane Whitehouse, who participates in LIFEBOTS as the local leader for the European eHealth Multidisciplinary Stakeholder Platform (EHTEL) is on the Robotics4EU advisory board. LIFEBOTS recently resumed after a 2-year COVID suspension. As formal projects restart, we envision involving LIFEBOTS partners in Robotics4EU networking events and featuring Robotics4EU in LIFEBOTS workshops.

AUTOWORK

This project funded by the Research Council Norway has collaborated on many events with the ROBOTICS4EU project, co-hosted a writing seminar, and worked on mapping the future of work life.

Caring Futures

Research Council Norway funded project focusing on the future of healthcare, e.g., through robotics, has contributed to the healthcare workshops with keynotes and discussions. Caring Futures is hosting an art exhibit on future healthcare where robotics4eu is participating in a panel in autumn 2022.

LEE

Research Council Norway funded a support project that connects Norwegian SMEs and municipalities to LIFEBOTS activities. Vivian And Cecilia Campbell, who implement

welfare technology for the Ålesund municipality in Norway and are LEE partners gave a keynote At the Robotics4EU physical healthcare workshop on the 24th of May 2022. Additionally, Cecilie Campbell is on the Robotics4EU advisory board.
Good Brother
Dr. Eduard Fosch Villaronga from the Good Brother project, a COST action gave a keynote at the ROBOTICS4EU healthcare workshop.

Table 6 Partner and external network

5 Ethics and Compliance

All activities implemented as part of WP5 will be required to follow the ethics and data protection rules and procedures set out in the Robotics4EU project, as well as in compliance with all other relevant and common practices regarding ethics and private data. Specifically, all events and activities will be required to comply with the procedures described in the Robotics4EU ethics-related deliverables D7.1 "Requirement No. 1" and D7.2 "Requirement No. 2".

6 Conclusions

The first period of the project was characterised by the initiation of many activities. We have established significant collaboration and synergies with many EU-funded initiatives and projects. The stakeholders mapping process resulted in having a database of more than 800 contacts for future use. Keeping in mind our commitment to robotics community building, we have taken an active part in initiating collaboration with ICT-46-2020 projects and participating in the events organised by the EU.

All cooperation with projects is also strongly related to the project's sustainability plan (D5.2) and exploitation strategy (D5.6). Our primary goal is making project outputs sustainable beyond the project horizon, that is why cooperation with other projects is key. Productive cooperation makes it possible to raise citizens' awareness of developed solutions and to involve the European agile robotics community to the highest extent.

In addition, we have developed the very first version of the VR exhibition. This is an attractive and innovative solution to introduce various robotics solutions and the results of Robotics4EU at European events. The project team was proud to launch the VR exhibition on June 28, 2022, at the European Robotics Forum.

During the next period, we will focus on improving and promoting the VR exhibition and more strategic cooperation with other EU-funded projects. Version 2 of the current deliverable will be prepared by the end of the project (D5.8).

7 Annex

Robotics companies to be included in VR Exhibition. It is the very first contact mapping, and the tables will be improved later on.

DENMARK			
Categories	**Company**	**Product / solution**	**Answer**
Digital country	1. Agency for Digitisation	1. Towards a digitised society: We usually say that "everyday life is digital". The public sector is gradually becoming fully digital and digitisation is today unavoidable, but a prerequisite in a modern welfare society. Digitisation is a key driver for creating a coherent, accessible, and citizen-focused public sector.	1. Digist- no physical product to share.
	2. KMD	2. developing IT solutions designed to meet every aspect of the changing digital needs of modern societies and organizations.	
Industry	Kassow Robots	Kassow Robots develops and produces uniquely efficient industrial collaborative lightweight robots with 7 axes.	No answer
Robotics	1. Universal Robots	1. Collaborative robots.	No answer
	2. Mobile Industrial Robots (MiR)	2. Autonomous mobile robotic solutions used in a wide variety of fields.	
Education	1. Kubo	1. KUBO is a simple, intuitive plug-and-learn tool with low complexity and easy adoption for teachers. Kubo is used to teach coding.	No answer
	2. Shape Robotics		

Categories	Company	Product / solution	Answer
		2. Modular robotics system used for education.	
Smart city	1. Copenhagen Solutions Lab	1. Development unit with a focus on how to identify and coordinate smart city-needs in the municipality's departments and match them with existing knowledge and solutions on the market.	2. They do not have physical product, but will lead me to the right point
	2. We build Denmark	2. Sustainable construction and circular economy. Digital transformation and automation. Smart City	
	3. Gate 21	3.Sustainable Mobility, Energy Conversion, Smart Sustainable Cities and Circular Economy & Resources.	

NORWAY			
Categories	**Company**	**Product / solution**	**Answer**
Digital country	1. Centre for Digital Life Norway	1. The Centre for Digital Life Norway (DLN) transforms Norwegian biotechnology research and education to increase innovation and value creation for society. The centre has research projects all over the country. Transdisciplinary collaboration is our trademark.	No answer
	2. Digital Norway	2. DigitalNorway is one of five fully operational Digital Innovation Hubs (DIHs) in Norway.	
Industry	1. ScoutID	1. Drone-based inspection system for industrial confined spaces	No answer

Robotics	1. ROBOTNOR	1. Next generation robotic technology for the Norwegian industry	No answer
Education	1. No Isolation	1. The student's "physical presence" in the classroom whilst the young person accesses the robot from the hospital or home.	No answer
	2. Interactive Norway	2. Leading competence centre for interactive screens for schools and meeting rooms	
Smart city	1. Maritime cleantech	1. ZAWAS: Zero-emission Automated WAter Shuttles. The cost-efficient, environmentally friendly future of public transportation in urban areas.	No answer

PORTUGAL			
Categories	**Company**	**Product / solution**	**Answer**
Digital country	Introsys	Robotics for textile, automotive, food and manufacturing industries. OEM Automation services.	No answer
Industry	Chariot Robotics	Services for maritime, offshore and other industrial operations like Robotic Hydro-Jetting, Hydrodemolition, technical support, and equipment rental.	No answer
Robotics	1. Talus Robotics	1. The development of advanced and flexible industrial robotized solutions: 6D-Mimic a programming system for painting robots and the LeanAGV.	No answer
	2. Turflynx	2. The first driverless lawn mower	
Education	1. Open Grow	1. The versatile and powerful grow controller, that allows to automate all the aspects of any agricultural grow.	2. coolfram-NO

Smart city	2. Cool Farm Alliance 1. Tugbot	2. The industry platform for sustainable agriculture metric development and use 1. Intra-logistics automation for warehouses, construction sites and factories.	No answer
	2. Connect Robotics	2. Drone delivery and automation for urban and hard to reach destinations.	

FRANCE			
Categories	**Company**	**Product / solution**	**Answer**
Robotics	Instar Robotics	Logistics in agricultural settings	No answer
Robotics	Agreenculture	Automated farming solution	Interested
Robotics	Naio Technologies	Automated farming solution	No answer
Robotics	Vitibot	Autonomous solution for viticulture	No answer
Robotics	Vitirover	Autonomous mower robots	Interested
Robotics	Ecorobotix	Precision autonomous sprayers for agriculture	No answer
Smart city	Stanley Robotics	Fully automated valet robot and car storage service. Already testing their service with airports	No answer

LITHUANIA			
Categories	**Company**	**Product/solution**	**Answer**
Digital country	Tausan Robotics	The next generation modular Assistant Robot specifically designed for Households, Hospitality, Healthcare and Retail.	Interested
Industry	Rubedos	Robotics in the fields of computer vision and unmanned operations	No answer
Education	Elinta Robotics	Robotics for manufacturing	No answer
Smart city	Robotopia	Autonomous systems for delivery, agriculture and other industrial applications	No answer

ESTONIA			
Categories	**Company**	**Product/solution**	**Answer**
Smart city	Cuploop	Automated collection and deposit refund for reusable packages	Added to the expo
Industry	Threod systems	Unmanned aircraft systems and sub-systems for intelligence collection and surveillance tasks	No Answer
Industry	Milrem AS	Robotics solutions that increase human safety and labour efficiency in defence, agriculture, forestry, municipal services, rescue and mining.	Added to the expo
Smart city	Starship	Food and package delivery services that improve everyday life.	Added to the expo

| Smart city | Cleveron Mobility AS | The self-driving delivery vehicles adaptable to size and type of transported items. | Added to the expo |

OTHER COUNTRIES			
Categories	**Company**	**Product/solution**	**Answer**
Agriculture	Robs4crops	Robotics agri euro project	They could be interested, but later in 2023
Industry	Company Abele (Germany)	It produces quite impressive grippers for handling of fabric	No Answer
Research	Research Centre DLR (Germany)	It is building a robot work cell with 2 robots that collaborate.	No answer
Research	Research Centre Profactor (Austria)	It is building a collaborative work cell with a large robot.	No answer

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