Robotics4EU

Boosting Wider Adoption of Robotics in Europe

D3.3

Knowledge transfer and capacity building in agri-food

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Deliverable D3.3

Knowledge transfer and capacity building in agri-food

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Index of Contents

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101017283

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101017283

Index of Tables

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101017283

Index of Figures

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101017283

1 Executive Summary

This is a report of the five digital workshops organised by AgrifFood Lithuania DIH and the Robotics4EU project and themed around agri-food robotics. The workshop implementation was part of WP3 Empowerment of responsible robotics community Task 3.3 Knowledge transfer and capacity building in agri-food within the time frame proposed – July 2021 to June 2022 (M7-18) of the project implementation. The workshops were implemented in accordance with the methodologies presented in D3.1 Methodology of the community building and knowledge transfer events.

All five events were organised by the AgriFood Lithuania DIH (AFL) team. The main event team were Edita Karvelienė, Head of Events, Giedrius Leskauskas, Head of Communications, Diana Šalkauskiene and Thomas Gitsoudis from the project management.

The aim of the workshops was knowledge transfer and capacity building in agri-food as well as empowerment of responsible robotics community and presenting the public with five non-technological challenges in robotics adoption. The five non-technological challenges identified as ethical, socio-economic, and legal challenges, data management and education and engagement related issues.

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2 Introduction

The topic of robotics in the Agrifood sector is still very new, and most of the stakeholders have a limited understanding of non-technological issues. 5 workshops were organised to inform and raise awareness about these topics. Workshops served as a capacity-building opportunity, networking, and establishing connections between the robotics community. Results from the workshops served other project tasks and fed Maturity Assessment tool and a policy recommendation report.

5 workshops were held, attended by 337 people, including academia, industry, regulatory bodies, media, and the general public - stakeholders groups identified in the D.1 Methodology of the community building and knowledge transfer events. All five workshops were organised to talk about one of five non-technological challenges identified as ethical, socio-economic and legal challenges, data management and education and engagement-related issues. 4 workshops were held online and the final workshop was on-site as a part of a bigger event - Lithuanian Economic conference “Davosas”.The screenshots and images of workshops are provided in Appendix 2: Workshops’ Images and Screenshots.

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3 Approach

3.1 Overview of the event planning

All the workshops were organised following the methodology that was developed under the WP 3 Task 3.1. Every workshop had three presentations by the expert, brainwriting sessions, impact assessment questions and teamwork in break-out rooms. The organisation of the workshops started a month before the events following the schedule presented in the table below.

Time	Activity
The first week of planning	Event planning meeting, strategy on implementation, event theme clarification, strategy/ideas on potential speaker search.
Second week	Contacts and invites sent to potential speakers and moderators of break-out groups.
Second week	The content of a workshop prepared – impact assessment and brainwriting session questions clarified, and the material for break-out room sessions prepared.
Third week	Speakers and moderators for break-out room sessions confirmed. Event schedule prepared with presentation topics. The moderator of the workshop was found. The visual material for the event promotion was prepared.
Second-Third week	The active event promotion through AgriFood Lithuania DIH social media channels, newsletter, personal invitations, and also the same promotion through partners promotion channels.
A few days before the event	The last preparations before the event. The moderator, moderators of break-out room sessions and speakers were introduced to the Butter platform. The workshop material and questions from all the sessions were presented to moderators.

Table 1 Workshop implementation schedule

3.2 Qualitative and quantitative analysis of event participant profiles and their relation to stakeholder groups

The total amount of participants was 337 throughout all the events (plus 480 Online viewers during the last live event, though we did not include them in the analysis, viewers' profiles are not available, and they did not participate in question and discussion sessions). We identified 4 stakeholder groups participating. The Public authorities (14), Companies and farmers (95), University and research institutions (120) and the Media (5). The participants from university and research institutions and companies and farmers were the biggest groups and remained the dominant stable throughout all the events, except for the fourth workshop, "Agri-food robotics adoption and change", – which was the part of the hackathon, so a big portion of the participants were the students. On the contrary, the last live event, "Policy issues in agri-food robotics", being a part of the economic conference, had most of the participants from private companies and only a few people, lecturers from research institutions joined. We are not able to

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identify 108 participants, as the Butter platform does not require to fill in a full name and surname to participate in the event, this is the reason why a third of all participants are unmodified (Figure 1).

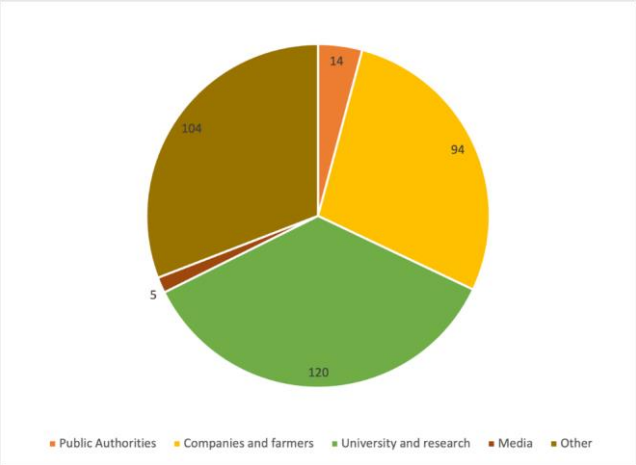

Figure 1 Qualitative and quantitative participant profile

The workshops were conducted in the Lithuanian language except for the first (Non-technological challenges in robotics) and third (Perceptions and social acceptance of robotics in AgriFood) online workshops, so the majority of the participants were Lithuanians. Although again due to the Butter platform participant admission process and the information that the platform generates it is impossible to recognize the country of origin of a participant. Although from the registration data we could say that around 15% of participants were non-Lithuanians.

3.3 Analysis and overview of the main outcomes of events

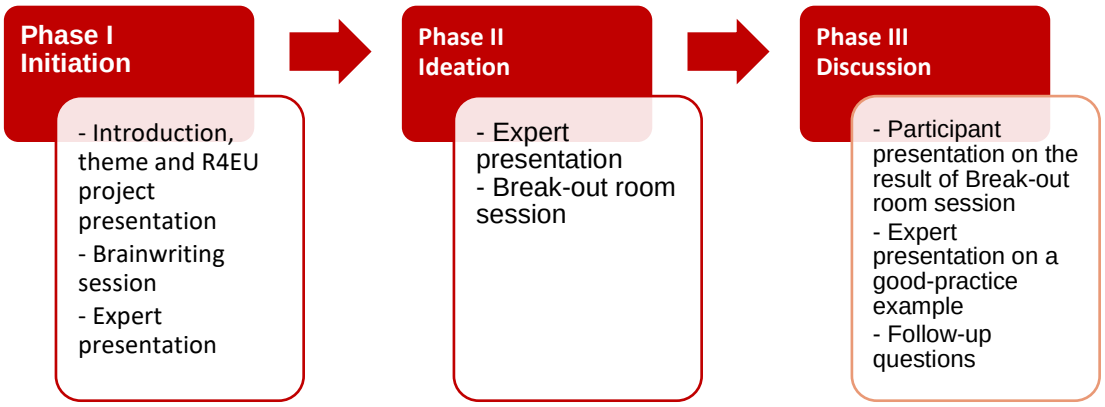

Figure 2 Online workshop model agenda

The content presented in the events was also consistent throughout all the workshops. In the introduction – the short presentation of the Robotics4EU project where aims and major potential project outcomes were presented followed-up by a presentation about the Maturity Assessment Tool that the project is developing. During these presentations the Robotics4EU platform was advertised as well.

Three presentations by the experts in each event were within the scope of the theme of each workshop and one of the presentations was on a good-practice example.

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The brain-writing session questions, the impact assessment questions, and the discussions during the break-out session also were consistent throughout all the events no matter what the theme of the workshop was. They addressed all the five types of non-technological challenges to the widespread adoption of robots in society recognised in the Robotics 4EU project: ethical challenges; legal challenges; data protection, and data management; socio-economic challenges and challenges related to education and engagement. Also, Maturity Assessment Model evaluation questions were given to participants.

The questions were presented through the Butter platform with the possibility for participants to pick their answer, write it or vote for the best answer presented. Questions were raised at the beginning and the end of the workshop. Break-out room discussions were also focused around those 5 challenges, discussion was organised in a way where participants shared their good-robotics practice examples and the social issues that practice encounters. The event was organised in compliance with Robotics 4EU ethics and data privacy policies.

3.4 Deviations in Methodology

The workshops were organised in such a way that presentations by the experts were not impactful on Impact assessment answers and brainwriting session outcomes as those sessions were conducted in the beginning of each workshop, before the presentations. Results from these sessions analysed, compiled and combined as significant differences between participants answers the workshops were not observed. Maturity Model evaluation results were analysed as a combination from all five workshops. The Break-out room sessions on the other hand were highly impacted by the given presentations so the results from those will be presented separately for each workshop. All the outcomes are presented further in the “Key event outcomes and transferable results” chapter.

One of the essential parts of the workshops was the Maturity Assessment Model presentation. LNE partner pre-recorded video presenting the model and at the beginning of each workshop model was explained to the participants. At the end of workshops participants were asked evaluation questions about the model. The results of these sessions were presented further in the “Key event outcomes and transferable results” chapter.

The main deviations from the D3.1 Methodology were observed during the Break-out room sessions. Even though for each workshop there was set of questions that participants had to answer, the level of the discussion varied a lot depending on the participant level of knowledge:

- Agrifood robotics generally appeared to be a new topic in a still very conservative sector. Many participants could not name any agricultural robots without mentoring. Participants also were sceptical about the relevance of non-technological issues.
- The basic knowledge about robots was lacking as well. Number of participants did not know what a robot is, and had a limited understanding of humanoid robots.

Due to lack of knowledge, discussions were low in activity. Moderators had to merge groups into bigger ones to have a good discussion. The discussions generally did not follow the D3.1 Methodology, but rather were left in a free flow and were highly impacted by the expert presentations and participant profiles. Outcomes of discussions are presented in chapter “Key event outcomes and transferable results”.

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4 Overview of the workshops

Each workshop had 3 expert presentations, from which one was a good practice example. Each workshop had a slightly different theme and focused on different non-technological issues. The speakers were chosen to be as much relevant to the topics as possible. The Presentations, topics, and short summaries of all 5 workshops are listed below.

4.1 Workshop 1. Non-technological challenges in robotics

General information	Robotics4EU first agri-food workshop
Event type	Online workshop
Priority area related to the event	Knowledge transfer and capacity building in agri-food
Event theme	**Non-technological challenges in robotics**
Organising partner	AgriFood Lithuania DIH
Other associated parties	Kaunas University of Technology, Factobotics, FoodScale Hub, Build Stuff, ART21, Vilnius University, Visoriai Information Technology Park
Date of the event	24th of November 2021
Location of the event	Virtual meeting, Butter platform
Number of participants	70
Description of participant profiles	Public officials -3; Companies and farmers – 20; University and research institutions – 22; Media – 1; Other – 24.
Event abstract	It was an international workshop for everyone from robotics innovators, developers and policymakers to end-users and society. The workshop aimed to increase stakeholders' awareness about non-technological challenges in robotics, such as potential ethical, legal, data security, privacy, or socioeconomic issues. During the workshop, recognized experts shared their knowledge on non-technological robotics challenges that they face with the participants. In addition, competencies and experience were shared in working groups during the search for solutions to existing and potential non-technological challenges in the development and application of robotics.

Table 2 Robotics4EU first agri-food workshop.

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4.1.1 Participants

There were 70 participants present. Participant profile split between the representatives from agricultural companies including farmers (20 people) and representatives from research institutions (22). There were 24 unrecognised participants and 3 public officials.

4.1.2 Speakers

Key speakers of this workshop were:

- Prof. Dr. Vidas Raudonis, the Kaunas University of Technology “The Biggest Non-technological Challenges in Robotics”. Vidas Raudonis is a professor at KTU's Faculty of Electricity & Electronics and has created multiple prototypes using numerical intelligence and image processing methods. He also owns and directs UAB Power of Eye, a company focused on using computer vision and AI in industry.
- Grigoris Chatzikostas, Vice President of Business Development at FoodScale Hub “Contribution of robotics to EU Green Deal goals and SDGs”. Grigoris Chatzikostas is an expert in agritech & foodtech financing innovation. He manages multi-national & cross-sector consortia, develops EU funding proposals, and coordinates large projects to promote tech-enabled entrepreneurship in the agrifood sector.
- Justinas Katkus, Head of product design at Factobotics “Examples of good practice”. J.Katkus is an IT and Robotics professional with extensive experience in product development and R&D.

4.1.3 Summary and takeaways of the workshop

The "Non-technological challenges in robotics" workshop focused on discussing the non-technical barriers faced in the field of robotics such as ethical, social, economic and regulatory issues. Participants explored the impact of these challenges on the development and deployment of robotics technology and exchanged ideas on potential solutions. The goal of the workshop was to raise awareness of the non-technical challenges in robotics and to encourage interdisciplinary collaboration in addressing these important issues.

The workshop highlighted the following key takeaways:

1. Importance of Ethical Considerations: The workshop emphasised the importance of ethical considerations in the development and deployment of robotics technology.
2. Awareness Raising: The workshop aimed to raise awareness about the non-technical challenges in robotics among Lithuanian stakeholders and to encourage a wider public debate on these issues.
3. Importance of Regulation: Participants emphasised the need for effective regulation to ensure the responsible and safe deployment of robotics technology.
4. Balancing Benefits and Risks: The workshop explored the potential benefits and risks of robotics technology and discussed ways to mitigate the risks while maximising the benefits.
5. National and International Perspectives: The workshop brought together experts from Lithuania and other countries, providing a unique opportunity to exchange perspectives and experiences on non-technological challenges in robotics.

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4.2 Workshop 2. Robots as data miners: monetization, privacy and security

General information	Robotics4EU second agri-food workshop
Event type	Online workshop
Priority area related to the event	Knowledge transfer and capacity building in agri-food
Event theme	**Robots as data miners: monetization, privacy, and security**
Organising partner	AgriFood Lithuania DIH
Other associated parties	COBALT, Industrial Robotics, Uvireso
Date of the event	24th of March 2022
Location of the event	Virtual meeting, Butter platform
Number of participants	68
Description of participant profiles (with numbers by target group)	Public officials 3, Companies and farmers 11, University and research institutions 14, Media 1, Other 39.
Event abstract	This was the second workshop of a series of five creative workshops on the non-technological challenges of robotics. During the discussion, which was held in Lithuanian, we talked about robots as data miners. We discussed the challenges posed by robotization to data security and privacy as well as how data collected by robots could be monetized without compromising the security and privacy of the personal data. During the creative workshop, we worked in groups. There were three presentations: a general overview of the current situation, an evaluation of the issue by lawyers and an example of good practice by the expert.

Table 3 Robotics4EU second agri-food workshop.

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4.2.1 Participants

There were 68 participants during this workshop. Unfortunately, most of the participants were not recognized - 39. Others were agricultural companies' representatives (11) and research community members (14). 3 Public officials were present as well. Workshops were held on the Butter Platform in Lithuanian language, so all the participants were Lithuanians.

4.2.2 Speakers

- Julius Vasylius, Head of Sales and Business at Industrial Robotics "What manufacturing problems do robots help solve?"Julius Vasylius is a seasoned sales & biz dev professional with proven experience in B2B & B2G sales, business dev, product & project management. He excels in sales in the Automation, Process Industries, Robotics, Defence, and Aerospace sectors.
- Dr. Jonas Klimantas, Head of Technology at Uvireso "Public safety - creating a glowing dog" Dr J.Klimantas more than 30 years is working with deep tech innovations the most attention giving in the field of light technology.
- Renata Vasiliauskienė, Senior associate at Cobalt "How to ensure user privacy in the age of robotics?". R.Vasiliauskienė is a Senior Associate, Assistant Attorney-at-Law, in COBALT's Intellectual Property and IT Regulatory Law Practice Group. Her main areas of work are data protection, employment law and corporate law. Renata also has experience in various e-commerce issues (including consumer protection), as well as EU packaging and labelling.

4.2.3 Summary and takeaways of the workshop

"Robots as Data Miners" workshop focused on the challenges and opportunities in the field of robotics, specifically discussing monetization, privacy, and security aspects. The workshop aimed to bring together experts to discuss the impact of robotics technology on society, addressing how data mining can be used to generate revenue while maintaining privacy and security. The discussions centred around topics such as the ethical use of robots and data, the challenges of data protection, and the potential benefits of the technology.

Key takeaways from the workshop:

1. The workshop explored the monetization potential of robotics technology through data mining.
2. The discussions highlighted the importance of privacy and security in the use of robotics technology.
3. The workshop addressed the ethical implications of data collection and analysis by robots.
4. The experts examined the challenges of protecting sensitive data in a robotic context.
5. The discussions focused on the benefits of robotics technology, including the potential for new revenue streams.

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4.3 Workshop 3. Perceptions and social acceptance of robotics in AgriFood

General information	Robotics4EU third agri-food workshop
Event type	Online workshop
Priority area related to the event	Knowledge transfer and capacity building in agri-food
Event theme	**Perceptions and social acceptance of robotics in AgriFood**
Organising partner	AgriFood Lithuania DIH
Other associated parties	CEPS, BioSense Institute
Date of the event	28th of April 2022
Location of the event	Virtual meeting, Butter platform
Number of participants	71
Description of participant profiles (with numbers by target group)	Public officials - 1; Companies and farmers – 23; University and research institutions – 10; Media – 1; Other – 36.
Event abstract	It was an international workshop for everyone from robotics innovators, developers, or policymakers to end-users and society. The workshop aimed to increase the awareness of stakeholders about non-technological challenges in robotics, such as potential ethical, legal, data security, privacy, or socioeconomic issues. During the workshop, recognized experts shared their knowledge with the participants. In addition, competencies and experience were shared in working groups during the search for solutions to existing and potential non-technological challenges in the development and application of robotics.

Table 4 Robotics4EU third agri-food workshop.

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4.3.1 Participants

One public official was present during this workshop. Majority of participants were unrecognised - 36. Representatives from companies and farmers were 23, representatives from Universities - 10. Workshops were held on Butter Platform in English language, unfortunately to locate the country of origin was not possible as the platform does not collect this information.

4.3.2 Speakers

- Artur Bogucki, Research Assistant at CEPS “Perception as a factor in agricultural technology implementation” . Artur Bogucki is a Behavioural Law & Economics specialist with 3 years of PhD research experience in public & international law analysis, and evidence-based regulation. He has successfully assisted on projects for public institutions, private companies, and NGOs in public law, international law, governance, innovation, and evidence-based regulation.
- Dr. Oskar Marko, Assistant Director for Innovation and Collaboration with Industry at BioSense Institute "Agricultural robots revolutionising blueberry production" .Dr. Oscar is an expert in advanced ML, deep neural nets, and multi-objective evo algorithms applied to agriculture. He led BioSense's team that won 1st prize at Syngenta Crop Challenge 2017 for their novel data-driven yield prediction, smart seed selection, and optimal seed distribution algorithm.
- Dr. Søren Marcus Pedersen, Associate professor at University of Copenhagen “Social impact of robots – experience from Robs4crops project”. Søren Marcus Pedersen is an Associate Professor at the University of Copenhagen's Department of Food and Resource Economics. He has an MSc in Agricultural Economics from the University of London and a PhD from the Technical University of Denmark. His research focuses on the adoption of new farm technology, agricultural economics, and agribusiness innovations, with a particular emphasis on smart farming systems, such as precision farming for field crops and the use of auto-steering and field robots.

4.3.3 Summary and takeaways of the workshop

The workshop "Perceptions and Social Acceptance of Robotics in AgriFood" aimed to examine the views and attitudes of society towards the integration of robotics in agriculture and food production. The discussions centred around the challenges and opportunities of using robots in the industry and how they can impact the workforce and consumers. The goal of the workshop was to explore ways to increase public understanding and acceptance of the technology, in order to ensure its successful implementation and development.

Key takeaways from the workshop:

1. Understanding of public perception and social acceptance of robotics in agriculture and food production.
2. Discussion of challenges and opportunities of using robots in the industry.
3. Examination of the impact of robotics on the workforce and consumers.
4. Exploration of ways to increase public understanding and acceptance of the technology.
5. Importance of ensuring successful implementation and development of robotics in AgriFood.

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4.4 Workshop 4. Agrifood robotics adoption and change

General information	Robotics4EU fourth agri-food workshop
Event type	Online workshop
Priority area related to the event	Knowledge transfer and capacity building in agri-food
Event theme	**Agri-food robotics adoption and change**
Organising partner	AgriFood Lithuania DIH
Other associated parties	Future Technologies DIH, Elinta Robotics, Vytautas Magnus University Agriculture Academy
Date of the event	4th of May 2022
Location of the event	Virtual Meeting, Butter platform
Number of participants	90
Description of participant profiles (with numbers by target group)	Public officials –2; Companies and farmers – 8; University and research institutions – 74; Media – 1; Other – 5.
Event abstract	This workshop was dedicated to agri-food robotics and what change it is impacting. The workshop was a part of a Hack Agrifood 2022 hackathon and was held in the Lithuanian language. Most participants were hackathon participants, so the audience was a bit different than from the previous workshops. We had a lot of students and their teachers with a lot of insights into a level of education on robotics. Three experts shared their knowledge on agri-food robotics adoption challenges. Next to the presentations, the experience was shared in working groups. In a working group, we discussed existing and potential non-technological challenges in the development and application of robotics.

Table 5 Robotics4EU fourth agri-food workshop.

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4.4.1 Participants

Overall there were 90 participants in the workshop. This workshop had a different profile - as it was a part of a hackathon - majority of participants were students - 74, but it was open to other participants as well. We had 8 people from companies and only 8 unrecognised. Workshops were held on the Butter Platform in the Lithuanian language.

4.4.2 Speakers

- Giedrius Bagušinskas, Innovation manager at Future Technologies DIH “A general overview of the application of robotics technologies and changes in the agro-food sector” . G.Bagužinskas besides being innovation manager at Future Technologies DIH also is the President of the Lithuanian Cluster Network and the representative of Lithuanian clusters in the European Cluster Alliance. He is also a founder, board member and director of the Lithuanian Food Exporters Association (LitMEA) and works with technologie companies for more than 18 years.
- Aurelijus Beleckis, CEO at Elinta Robotics “Success stories from the perspective of robot developers”. Elinta Robotics specialises in the automation of industrial operations and the creation, design, and implementation of product quality control systems. They provide innovative solutions to enhance the efficiency of customers' production lines.
- Dr. Rolandas Bleizgys, associate professor at Kaunas Technology University “Robots replace workers in animal husbandry”.

4.4.3 Summary and takeaways of the workshop

The workshop "Agri-food Robotics Adoption and Change" focused on the integration of robotics technology in the agriculture and food industry. It highlights the benefits and challenges of adopting robotics, as well as the impact on industry processes and workforce. The aim of the workshop was to provide insights into the latest developments and innovations in agri-food robotics and to facilitate discussions on the role of robotics in transforming the industry for the better.

Key takeaways from the workshop:

1. Overview of the current state and future trends in agri-food robotics
2. Benefits of adopting robotics in agriculture and food industry such as increased efficiency, productivity and food safety
3. Challenges faced in implementation such as cost, technology integration and workforce disruption
4. Discussion on non-technological issues arising implementing innovations in the agri-food sector.

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4.5 Workshop 5. Policy issues in agri-food robotics

General information	Robotics4EU fifth agri-food workshop
Event type	Hybrid event – physical workshop with a possibility to join online
Priority area related to the event	Knowledge transfer and capacity building in agri-food
Event theme	**Policy issues in agri-food robotics**
Organising partner	AgriFood Lithuania DIH, Lithuanian Economic Conference "Davosas"
Other associated parties	CEPS, Cobalt, European Parliament Liaison Office in Lithuania
Date of the event	25th of May 2022
Location of the event	Radisson Blu hotel conference centre, Vilnius, Lithuania
Number of participants	49 on-site, 480 online (no profile data available for online viewers).
Description of participant profiles (with numbers by target group)	Public authorities – 5; Companies and farmers – 32; University and research institutions – 11; Media – 1; Other – 480.
Event abstract	The final event of the Robotics4EU initiative in Lithuania took place during the biggest Economic Conference in the country "Davosas". The final event was organised according to the unique concept which has never been used in the context of non-technological challenges of robotics before - both live and online viewers were involved, and online viewers could participate by answering the questions together with live participants. The workshop was designed to be attractive for everyone from robotics innovators, developers or policymakers to end-users and society as a whole. However, the focus was on political issues. The representative from the European Parliament Liaison Office gave a presentation on legal regulations and future initiatives of agri-food robotics as well as experts from the legal office Cobalt and The Centre for European Policy Studies gave their presentations on today's legal issues and possible ways to improve.

Table 6 Robotics4EU fifth agri-food workshop.

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4.5.1 Participants

This live event were held during Economic Conference “Davosas”. The Conference were live but broadcasted, unfortunately the online participants were only watching and could not participate in the discussions or questionnaires, but there were 480 unique participants online. Onsite - 32 representatives from agrifood companies, 5 from public authorities and 11 from Research community. 49 participant in total.

4.5.2 Speakers

- Daiva Jakaitė Head of the European Parliament Office in Lithuania, “European Parliament debate on artificial intelligence”
- Renata Vasiliauskienė Senior associate at Cobalt, “Privacy in the age of robotics: how not to become an offender while using technologies?”
- Dr. Artur Bogucki Assistant Research at CEPS and lecturer at Warsaw School of Economics, “What determines political barriers and how to overcome them?”

4.5.3 Summary and takeaways of the workshop

The "Policy Issues in Agri-Food Robotics" workshop aimed to address the policy challenges and opportunities related to the integration of robotics in the agriculture and food sector. Topics discussed included ethical considerations, data privacy, intellectual property, and regulatory frameworks for the use of agri-food robots. The participants explored the potential benefits of robotics in areas such as precision agriculture, food production, and supply chain management, as well as the need for collaboration between stakeholders to ensure safe, efficient, and sustainable deployment of these technologies. Overall, the workshop provided a valuable platform for stakeholders to exchange ideas and discuss the policy issues that need to be addressed for the successful integration of agri-food robotics in the industry.

Key Takeaways of the workshop:

1. The workshop addressed policy challenges and opportunities in the integration of robotics in the agriculture and food sector.
2. Discussed topics included ethical considerations, data privacy, intellectual property, and regulatory frameworks for agri-food robots.
3. Potential benefits of robotics in areas such as precision agriculture, food production, and supply chain management were explored.
4. The need for collaboration between stakeholders to ensure safe, efficient, and sustainable deployment of agri-food robots was emphasised.
5. The workshop provided a platform for stakeholders to exchange ideas and discuss policy issues that need to be addressed for successful integration of agri-food robotics.

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5 Key event outcomes and transferable results

5.1 Impact assessment outcomes

At the beginning of each workshop, the multi-choice impact assessment questions were asked. The participants had a choice to answer - fully disagree, disagree, I don't know, agree, or fully agree. The statements were posed as follows:

1. I interact with robots in my work environment.
2. I interact with robots in my home/personal environment.
3. I believe I am aware of the main non-technical issues that the robotic industry faces.
4. I believe that various aspects of robotics are discussed sufficiently in the public discourse.
5. Technological progress is more important than social progress.

The main aim for this session is to find out the participant's level of knowledge and opinion on non-technological issues of robotics. The outcomes of this session are presented in Figure 3. All of the participants were familiar with robots either from home or from the work environment. Participants stated that they had some knowledge of non-technical issues that the robotic industry faces. The majority of participants disagreed with the statements that various aspects of robotics are discussed sufficiently in the public and that technological progress is more important than social.

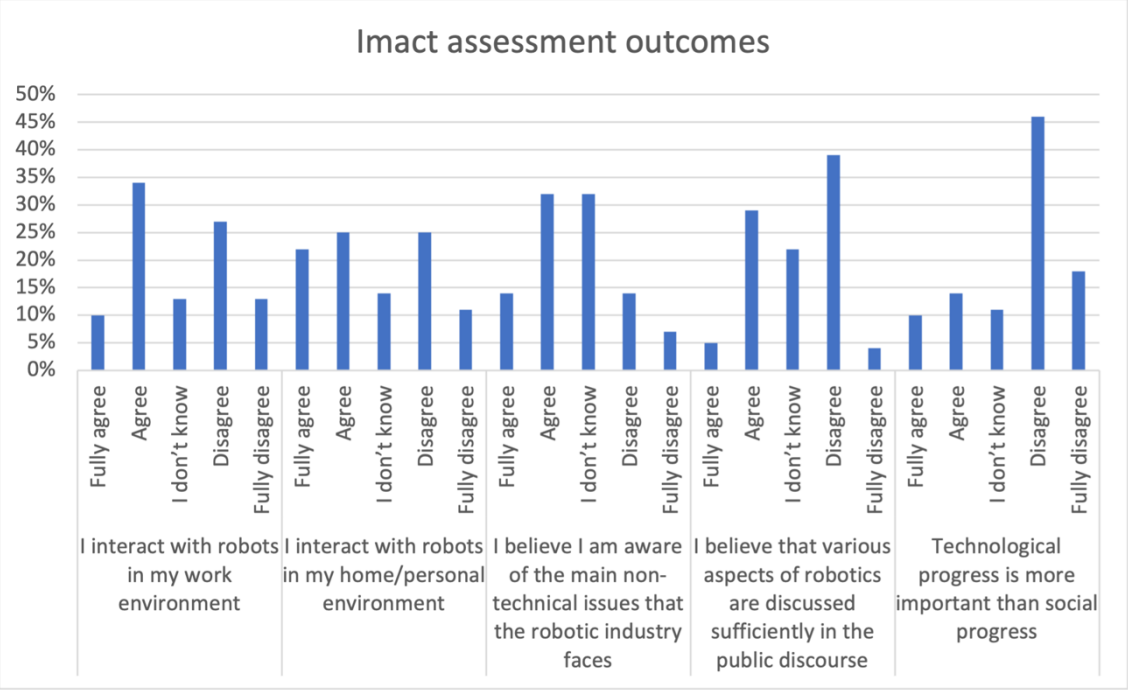

Figure 3 Impact assessment outcomes

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5.2 Brainwriting session outcomes

After the Impact Assessment questions were finalised, there were some open questions for the participants. These questions aimed to assess the level of knowledge of participants on non-technological challenges in robotics adoption as well as initiate discussion and get input on perceived main issues. The questions:

1. What are, in your opinion, the main socio-economic issues in the adoption of robotic solutions in the agri-food industry?
2. What are, in your opinion, the main ethical issues in the adoption of robotic solutions in the agri-food industry?
3. What are, in your opinion, the main legal issues in the adoption of robotic solutions in the agri-food industry?
4. What are, in your opinion, the main issues regarding data management in the adoption of robotic solutions in the agri-food industry?
5. What are, in your opinion, the main issues regarding the educational and engagement processes in the adoption of robotic solutions in the agri-food industry?
6. What is, in your opinion, the most important issue area (socio-economic, ethical, legal, data management, educational and engagement processes)?

The main outcomes from the Brainwriting session are presented in the table below.

Issue area	Challenges
Socio-economic challenges	Investment attraction, the lack of trust in robotics, restructuring of the workforce, acceptance, monopolisation of the sector due to the uneven adoption of technology and high barrier of entry.
Ethical challenges	The robots replacing the humans (decreased job availability and human labour appreciation); Data sharing issues; the responsibility for robot actions.
Legal challenges	The law legislations delay, licences for data sharing and handling, lack of safety legislations for robotics, lack of clarity in regulations
Data management	Data security, data storage issues, data mistakes
Educational and Engagement processes	The lack of talent and specialists; Lack of information and educational programs, lack of interest in agricultural education in general.

Table 7 Brainwriting session outcomes

The majority of participants recognised Socio-economic and Education challenges as the main issue area and also pointed out that there are ethical, legal and data protection issues (Figure 4).

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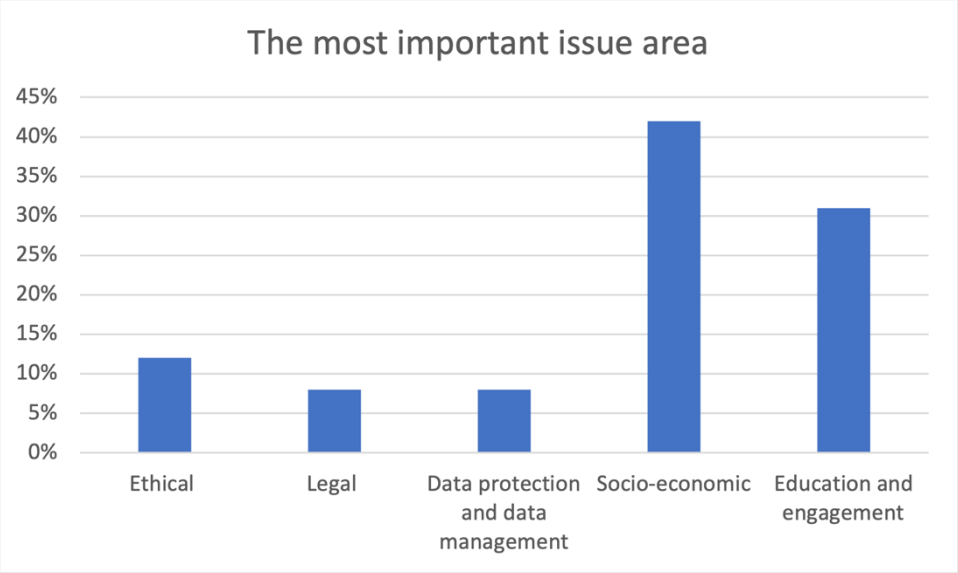

Figure 4 Brainwriting session outcomes.

5.3 Break-out room sessions

Break-out rooms sessions started after two expert presentations that were following the Impact Assessment and Brainwriting session. During the break-out room sessions, the following questions were presented to the participants:

- Which category/ies of issues does your good practice address?
- What are the criteria you considered for implementation of good practice and lessons learned?
- Success criteria (conditions that you think best contributed to the application for the good practice)
- What are the challenges encountered in applying good practice? Theoretical constraints not met (barriers)? How have they been addressed?
- What are the possibilities of replicability and adaptability of this good practice?
- Based on your experience, list internal and external conditions that should be in place for good practice to be replicated (institutional, economic, social, environmental)
- What are the tools and methods needed to adapt the good practice to make it possible to transfer successfully?
- What has been the outcome of this good practice? (Please provide the information based on comparable results)
- Is the outcome descriptive/quantitative/direct results?
- Has the good practice reached a positive impact? If yes, please explain.
- What are the elements that need to be put into place for the good practice to be institutionally, socially, economically, and environmentally sustainable?

Due to the big variation in participants' backgrounds and knowledge of robotics solutions, it was not possible for each participant to answer all those questions. The discussion was organised to focus on the most relevant non-technological agri-food robotics challenges that participants have knowledge of and can share examples of good practices. Also, the moderators of break-out sessions shared their experiences on robotics adaptation and the challenge it faces.

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The first workshop - Non-technological challenges in robotics

As a first workshop this was the most generic workshop trying to introduce the community to these challenges. The expert presentations were more generic - Prof. Dr. Vidas Raudonis from the Kaunas University of Technology talked about “The Biggest Non-technological Challenges in Robotics” focusing mainly on the Lithuanian landscape, Grigoris Chatzikostas, Vice President of Business Development at FoodScale Hub talked about “Contribution of robotics to EU Green Deal goals and SDGs” and Justinas Katkus, Head of product design at Factobotics showed some “Examples of good practice”. The workshops were held in English and around half of the participant were non-Lithuanians. There were 7 discussion groups with approx. 10 participants per each. The discussions were impacted by these presentations and many participants discussed more generic global topics. The discussions were not particularly focused mainly on the agri-food sector. Participants were not very engaging, and general knowledge about such issues was low. The moderators needed to explain in detail each non-technological issue, give an example and very often the discussion started from the question - what is considered a robot? Participants were not aware of the high variety of robots already available and operating and often had limited idea of a robot as a humanoid robot or a cleaning robot. Main challenges were pointed out - data security and lack of investments, but participants in general were rather sceptical of the relevance of such problems since robotics is still a very new sector. Even though participants had very generic idea of the robotics sector still majority emphasised the need for effective regulation to ensure the responsible and safe deployment of robotics technology.

The second workshop - Robots as data miners: monetization, privacy and security

The second workshop were organised to focus on privacy and security issues. Julius Vasylius, Head of Sales and Business at Industrial Robotics talked about “What manufacturing problems do robots help solve?”, Dr. Jonas Klimantas, Head of Technology at Uvireso gave a very interesting presentation “Public safety - creating a glowing dog” and Renata Vasiliauskienė, Senior associate at Cobalt had presentation solemnly on privacy issues - “How to ensure user privacy in the age of robotics?”. There were 7 discussion rooms with approx. 10 participants per each. The discussion were impacted by presentations and were focused mainly on privacy issues. Participants pointed out the data security issues, the lack of trust in robots lack of policy regulations. Again the discussions were not very active and moderators needed to lead a lot as well as present examples and some time to explain what a robot is. The concept of digital robot were considered something interesting and very relevant talking about privacy issues. The discussions highlighted the importance of privacy and security in the use of robotics technology and this is was the topic were participants felt more comfortable and had many interesting examples and concerns about data leakages and third party involvement in such technologies. The discussions also focused on the benefits of robotics technology, including the potential for new revenue streams and overall importance of digitalisation in business operations.

The third workshop - Perceptions and social acceptance of robotics in AgriFood

This workshop was the first workshop that particularly very focused on agrifood sector. Even though during previous workshops robots in Agrifood sector were discussed as well, this time the workshop was exclusively dedicated to agrifood robots. The workshop was held in English and all three presenters were experts from different European countries. Artur Bogucki, Research Assistant at CEPS talked about “Perception as a factor in agricultural technology implementation” , Dr. Oskar Marko, Assistant Director for Innovation and Collaboration with Industry at BioSense Institute gave a presentation

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about "Agricultural robots revolutionising blueberry production" and Dr. Søren Marcus Pedersen, Associate professor at the University of Copenhagen talked about “Social impact of robots – experience from Robs4crops project”. Participant profiles were international - around half of the participants were non-Lithuanians. There were 7 discussion groups with around 10 participants per each. Participants discussed robots and their use in agriculture. Talking about privacy issues, one of the issues recognized is the agricultural drones and the regulations around them - how to make sure that drones will not capture the neighbouring fields or people, or how to prevent it to be damaged by the “angry neighbour”. Also highly talked about issues was lack of talent and very important investment issues. Discussion of challenges and opportunities of using robots in the industry, for instance, the impact of robotics on the workforce and consumers. Participants talked about robots taking away jobs from people or making the workplace “cold” and non-human, but these were considered as more anecdotal issues rather than real problems since robots are here not to replace people but to improve the workplace.

Participants recognised that digitalization is very important for every business and especially for agriculture since farmers tend to be more conservative and adopt changes slower than in other sectors. Some ways were explored to increase public understanding and acceptance of the technology and the importance of public education and the need for more discussions on these topics.

The fourth workshop - Agri-food robotics adoption and change

The fourth workshop was a bit different, as it was part of a hackathon. The majority of participants were students and the discussions were influenced by it. Giedrius Bagušinskas, Innovation manager at Future Technologies DIH gave a presentation about “A general overview of the application of robotics technologies and changes in the agro-food sector”, Aurelijus Beleckis, CEO at Elinta Robotics talked about “Success stories from the perspective of robot developers" and Dr. Rolandas Bleizgys, associate professor at Kaunas Technology University talked about “Will robots replace workers in animal husbandry”. The workshop was held in the Lithuanian language, there were around 9 discussion groups with 10 participants per each. Participants in general were better aware of the agrifood sector and robotics solutions in it and due to the fact that this was a hackathon - more active. The issues recognized were a lack of talent and a lack of investments. Participants were not very well informed or had very strong opinions about non-tech issues but were very interested and curious about them. Participants also talked about the problem of the agriculture sector is very conservative, farmers are old and there is a lack of a new young generation of farmers with fresh ideas and a willingness to adopt new technologies. Every year, according to a country's statistics there are fewer and fewer people who are studying agri-sciences and this is the main reason for the lack of talent in the regions. Participants recognized the benefits of adopting robotics in the agriculture and food industry such as increased efficiency, productivity, and food safety, but at the same time could pinpoint the challenges the implementation is facing - lack of talent, and lack of investment.

The fifth workshop - Policy issues in agri-food robotics

The fifth workshop was a live event with online broadcasting in both languages - Lithuanian and English. Daiva Jakaitė Head of the European Parliament Office in Lithuania gave a presentation about the “European Parliament debate on artificial intelligence”, Renata Vasiliauskienė Senior associate at Cobalt talked about “Privacy in the age of robotics: how not to become an offender while using technologies?” and Dr. Artur Bogucki Assistant Research at CEPS and lecturer at Warsaw School of Economics gave a speech about “What determines political barriers and how to overcome them?”.

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The workshop was focused on policy and there were 5 discussion groups with approx. 10 participants per each. Participants talked about policy challenges and opportunities in the integration of robotics in the agriculture and food sector. Discussion topics included ethical considerations, data privacy, intellectual property, and regulatory frameworks for agri-food robots and the common issue recognized was the lack of policies or the implementation of the policies behind technological adaptation. Even though Renata Vasiliauskiene talked a lot about how the right policy is implemented and they are not in delay, the opinion of participants was the opposite. Participants discussed a lot about the responsibilities of robots in case of emergency and the lack of more specific regulations when it comes to sectors or robots. Potential benefits of robotics in areas such as precision agriculture, food production, and supply chain management were explored, but also the need for collaboration between stakeholders to ensure the safe, efficient and sustainable deployment of robots. Participants highlighted the lack of trust in robots, lack of trust in technology effectiveness and fear of investments, and fear of drastic job market changes as the most pressing issues. Participants exchanged ideas on effective policy issues to be addressed to avoid these issues in the future. More regulations on data safety, on people safety, more clarity in the regulations and the need for licensing on data sharing.

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5.4 Maturity Assessment Model Evaluation

At the end of all workshops, the participants were presented with maturity assessment model evaluation questions. The Maturity Assessment Model Evaluation questions were these:

- I think there is a need for a tool for assessing the maturity of robotics solutions and their suitability for adoption.
- Who should be doing the maturity assessment of the robotics solution?
- Who would be most interested in the maturity assessment tool?
- What are the two most important issue areas a robotics maturity assessment model should take into account?
- What are the least two important issue areas a robotics maturity assessment model should take into account?

60% of participants answered that there is a need for a maturity assessment tool for robot solutions and their suitability. Other answers are presented in the table below.

Question	Participant Input
Who should be doing the maturity assessment of the robotics solution?	Responsible for the sector governmental entities, the newly formed expert entity for this purpose, European Union.
Who would be most interested in the maturity assessment tool?	Robotics solution creators, all the stakeholders of the robotics industry, and end-users.
What are the two most important issue areas a robotics maturity assessment model should take into account?	Socio-economic challenges, data security
What are the least two important issue areas a robotics maturity assessment mode should I take into account?	Engagement processes and ethical challenges

Table 8 Participants Input on Maturity Assessment Model Evaluation questions

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6 Community building

One challenge in hosting workshops to expand and enhance the responsible robotics community in agrifood was identifying the appropriate participants. The workshop organisers aimed to involve a diverse group of stakeholders with an interest in agrifood and robotics by bringing together experts from relevant robotics projects, researchers, industry, technical communities, students, agrifood personnel, and the general public. As the use of robotics in agrifood is still relatively new, it was important to also include potential future users. The engagement strategy encompassed a broad range of organisations, as listed and discussed in the table below:

COMMUNITY STAKEHOLDERS	ENGAGEMENT ACTIVITIES
Visoriai InformationTechnology Park	Visoriai Information Technology Park is the biggest technology park in Lithuania holding more that 50 tech companies in one place. VITP were helping in the organising of the workshops, looking for the speakers and spreading information about the events.
Robs4Crops Project	The project was presented during Dr. Søren Marcus Pedersen, presentation in the 3rd workshop “Social impact of robots – experience from Robs4crops project”. The project consortium was aware of the Robotics4EU project and assigned Dr. Søren to make a presentation.
FlexiGroBot Project	FlexiGroBot Project was presented during Dr. Oskar Marko, presentation in the 3rd workshop "Agricultural robots revolutionising blueberry production". The project consortium was aware of the Robotics4EU project and assigned Oskar to make a presentation.
FoodScale Hub	FoodScale Hub the company heavily involved in many AgriFood HORIZON deep-tech projects as a dissemination partner. CEO from the FSH were involved in the first workshop delivering the keynote presentation.
Lithuanian Robotics Community: Factobotics, Industrial Robotics, Uvireso, Elinta Robotics, ART21 etc	The Lithuanian robotic community was highly involved in workshops organisations either through participation, moderating break-out sessions or delivering key presentations. Many members from companies from CEOs to Technicians and Managers were involved in the workshops.

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CEPS Institute	Dr. Artur Bogucki Assistant Research at CEPS gave the key presentations two times - during the 3rd and 5th workshop.
Future Technologies DIH	FTDIH is a technology DIH in Lithuania. It was involved in many ways, The Innovation Manager, Giedrius Bagužinskas gave a key presentation on the 4th workshop, but also DIH helped attract participants through promoting the event.

Table 9 Community building

6.1 Feedback

At the end of each workshop, there were final survey questions presented that were a recap of the impact assessment questions. As in the beginning, there were multi-choice questions with the following options to answer - fully disagree, disagree, I don't know, agree, fully agree.
The questions:

1. Technological progress is more important than social progress.
2. I believe that various aspects of robotics are discussed sufficiently in the public discourse.
3. I believe I am aware of the main non-technical issues that the robotic industry faces.
4. This workshop helped me improve my understanding of the issues robotics faces. (not at all, slightly, moderately, significantly, this was new to me)

The aim was to determine if participants improved their knowledge during the workshop. Most participants stated that they did improve their knowledge, the answer to the question "I believe I am aware of the main non-technical issues that the robotic industry faces" answer "agree" raised from 32% (at the beginning of the workshops) to 80%. Participants also still disagreed with statements that technological progress is more important than social progress and robotics are not sufficiently discussed in public. 50% of responders stated that the workshop helped them better understand issues that robotics faces (Figure 5).

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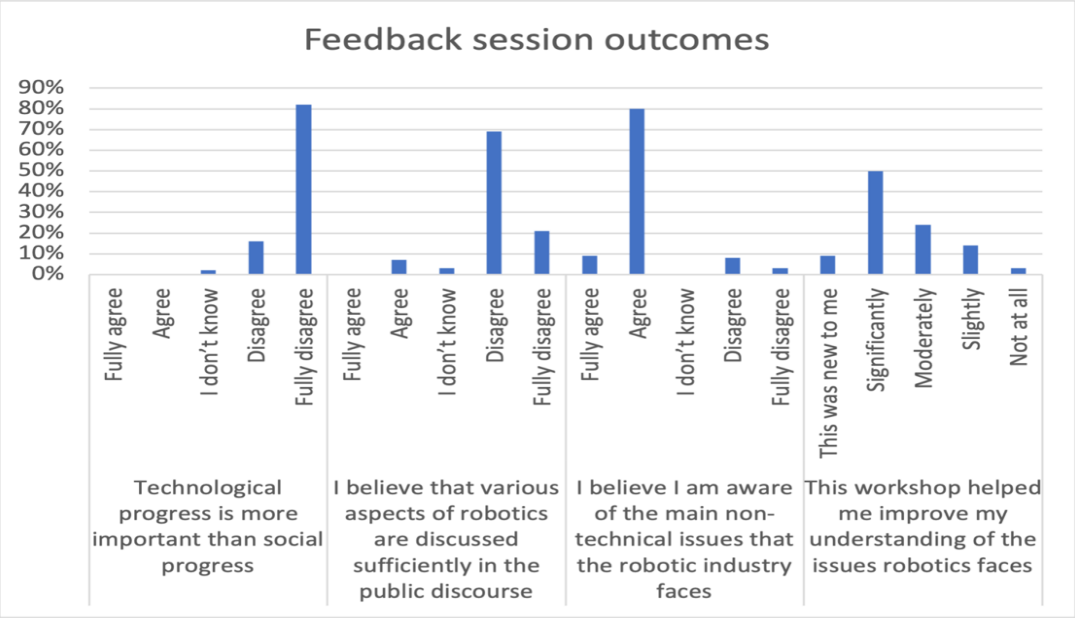

Figure 5 . Feedback session results

6.2 Additional impact & dissemination

The results from the workshop were transferred into other parts of the project. The results of discussions helped to establish the WP1 and Maturity Assessment model. The Maturity Assessment model used these results as a tool to identify the main problem areas and a validation of main non-technological issues that were determined by the project. Unfortunately, to use results from the events in more qualitative matters was not possible since the participants' awareness of the non-technological issues were low and knowledge limited.

Since there were several discussions dedicated to the policy issues - the results also fed WP4 T4.4 and T4.5. The inputs from the events were used in the policy recommendation outline to help identify policy issues, especially the last workshop 5 which was dedicated solely on policy issues.

The material, video recordings, were all shared and presented on the Robotics4EU platform for the rest of community:

https://www.robotics4eu.eu/recordings/workshop-policy-issues-in-agri-food-robotics-in-lithuanian/

https://www.robotics4eu.eu/recordings/workshop-agri-food-robotics-adoption-and-change-in-lithuanian/

https://www.robotics4eu.eu/recordings/workshop-perceptions-and-social-acceptance-of-robotics-in-agrifood/

https://www.robotics4eu.eu/recordings/workshop-robots-as-data-miners-monetization-privacy-security-in-lithuanian/

This was a input into WP2 and T2.1 Platform building. Also during each workshop - the platform were advertised and every expert participated with presentations - invited to be part of the community.

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7 Conclusions

AgriFood Lithuania DIH successfully implemented 4 digital workshops and 1 on-site event as a part of WP3 Empowerment of responsible robotics community Task 3.3 Knowledge transfer and capacity building in agri-food within the time frame proposed M7-18 of the project implementation (July 2021-June, 2022). The workshops reached all KPIs, which were at least 50 participants per digital event and 30 per live event (230 participants in total). On our end, we reached 337 participants throughout all the events (plus 480 online viewers during the last live event).

In conclusion the general observation, even though the participants after initial impact assessment and brainwriting session questions showed some knowledge of non-technological robotics issues, the general level of understanding and awareness is still low. The participants considered robotics to be still a very new area where these issues are not relevant, and had problems recognizing what a robot is, different robot types, and different application areas. Nevertheless, participants recognized the importance of adopting robotics in the agriculture and food industry such as increased efficiency, productivity, and food safety. The majority of participants recognized the workshops to be very informative and their initial knowledge improved, which also showed a feedback session at the end.

After analysing the participants' questionnaires from the brainwriting session - the main non-technological issues were identified – socio-economics and education challenges. All these issues were more in detail discussed during break-out room sessions. The most repeated issues were lack of education, talent, or just general information about robotics. Another important issue was the lack of investment or trust in technology to be able to give a return on investment. The third most talked about the issue was data security and general trust in robotics solutions to be safe to operate and hold data. The participants mostly were talking about these three issue categories and others were considered less important or talked about them only when asked or pointed out. Ethical and engagement challenges were considered the least important. Participants also pointed out the lack of legislation or legislative framework lagging behind technological progress.

The issues that were recognized to be particular to the agrifood sector were the lack of talent and "open-mindedness" to the new technologies, the participants talked about agri-sciences being less popular every year and that universities are forced to cut down agriscience programs. Also, the sector is considered to be more conservative in general than others, due to the older age of farmers. The robots for the agrifood sector that were discussed were mostly drones and some of the participants had problems recognizing other robotic solutions.

The Maturity Assessment tool was recognized as a needed tool although a majority of participants during the discussion expressed their skepticism about the relevance of non-technological issues in general because the robotic sector is very new and robots are not common enough to be already talking about non-technological issues. Participants correctly identified that the Maturity Assessment tool is needed by robotic creators but would be serving the users and the regulatory bodies as well.

During the workshops, the awareness and the importance of non-tech issues were raised and participants indicated that they left with a better understanding of all the issues that we as a society have to be aware of while working with robots and especially creating them.

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8 Appendix

8.1 Non-technological challenges in robotics

24 November 2021, 10:00 – 13:00	
10:00	Opening of workshop Welcome and intro by Anneli Roose, Civitta
10:15	Brainwriting session. Moderated by Lukas Keraitis, journalist
10:35	Presentation: “The Biggest Non-technological Challenges in Robotics” Prof. dr. Vidas Raudonis, Kaunas University of Technology
10:50	Coffee break
11:00	Presentation: “Contribution of robotics to EU Green Deal goals and SDGs” Grigoris Chatzikostas, Vice President of Business Development at FoodScale Hub
11:15	Teamwork session
11:50	Coffee break
12:00	Presentation of teamwork results
12:30	Presentation: “Examples of good practice” Justinas Katkus, Head of product design at Factobotics
12:55	Summary questions session. Closure of workshop.

8.2 Robots as data miners: monetization, privacy and security

24 March 2022, 11:00 – 13:45	
11:00	Opening of workshop Welcome and intro by Anneli Roose, Civitta
11:15	Brainwriting session. Moderated by Lukas Keraitis, journalist
11:35	Presentation “What manufacturing problems do robots help solve” Julius Vasylius, Head of Sales and Business at Industrial Robotics
11:50	Coffee break
12:00	Presentation “Public safety - creating a glowing dog”

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	Dr. Jonas Klimantas, Head of Technology at Uvireso
12:15	Teamwork session
12:50	Coffee break
13:00	Presentation of teamwork results
13:30	Presentation “How to ensure user privacy in the age of robotics?” Renata Vasiliauskienė, Senior associate at Cobalt
13:35	Summary questions session. Closure of workshop

8.3 Perceptions and social acceptance of robotics in AgriFood

28 April 2022, 10:00 – 13:00	
10:00	Opening of workshop Diana Šalkauskienė, project coordinator at AgriFood DIH
10:15	Brainwriting session. Moderated by Lukas Keraitis, journalist
10:35	Presentation: “Perception as a factor in agricultural technology implementation” Artur Bogucki, Research Assistant at CEPS
10:50	Coffee break
11:00	Presentation: "Agricultural robots revolutionising blueberry production" Dr. Oskar Marko, Assistant Director for Innovation and Collaboration with Industry at BioSense Institute
11:15	Teamwork session
11:50	Coffee break
12:00	Presentation of teamwork results
12:30	Presentation: “Social impact of robots – experience from Robs4crops project” Dr. Søren Marcus Pedersen, Associate professor at University of Copenhagen
12:55	Summary questions session. Closure of workshop

8.4

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8.5 Agri-food robotics adoption and change

4 May 2022, 10:00 – 13:00	
10:00	Opening of workshop Diana Šalkauskienė, project coordinator at AgriFood DIH
10:15	Brainwriting session. Moderated by Lukas Keraitis, journalist
10:35	Presentation: “A general overview of the application of robotics technologies and changes in the agro-food sector” Giedrius Bagušinskas, Innovation manager at Future Technologies DIH
10:50	Coffee break
11:00	Presentation: “Success stories from the perspective of robot developers”, Aurelijus Beleckis, CEO at Elinta Robotics
11:15	Teamwork session
11:50	Coffee break
12:00	Presentation of teamwork results
12:30	Presentation: “Will robots replace workers in animal husbandry”, Doc. Dr. Rolandas Bleizgys, associate professor at Kaunas Technology university
12:55	Summary questions session. Closure of workshop

8.6 Policy Issues in agri-food robotics

25 May 2022, 14:40–17:25	
14:40	Opening of workshop Kristina Šermukšnytė – Alešiūnienė, CEO at AgriFood Lithuania DIH
14:55	Brainwriting session. Moderated by Lukas Keraitis, journalist
15:15	Presentation “European Parliament debate on artificial intelligence” Daiva Jakaitė Head of the European Parliament Office in Lithuania
15:35	Presentation: “Privacy in the age of robotics: how not to become an offender while using technologies?” Renata Vasiliauskienė Senior associate at Cobalt.
15:50	Teamwork session

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16:25	Overview of results
16:45	Presentation “What determines political barriers and how to overcome them?” dr. Artur Bogucki Assistant Research at CEPS and lecturer at Warsaw School of Economics
17:10	Summary questions session
17:25	Closure of workshop

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9 Appendix 2: Workshops' Images and Screenshots

9.1 The first workshop

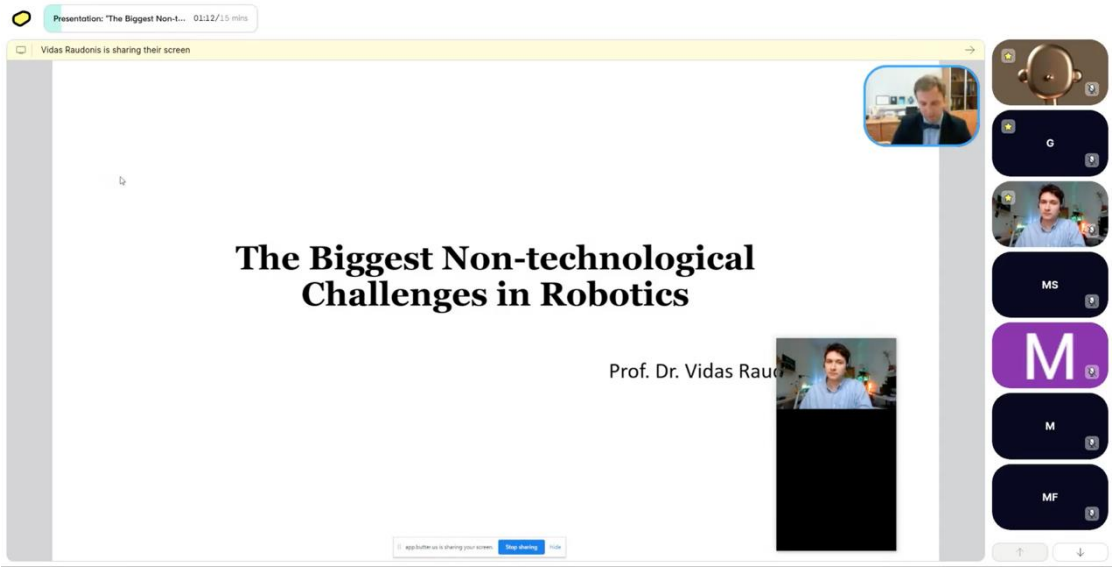

Figure 6 Robotics4EU first agri-food workshop screenshot.

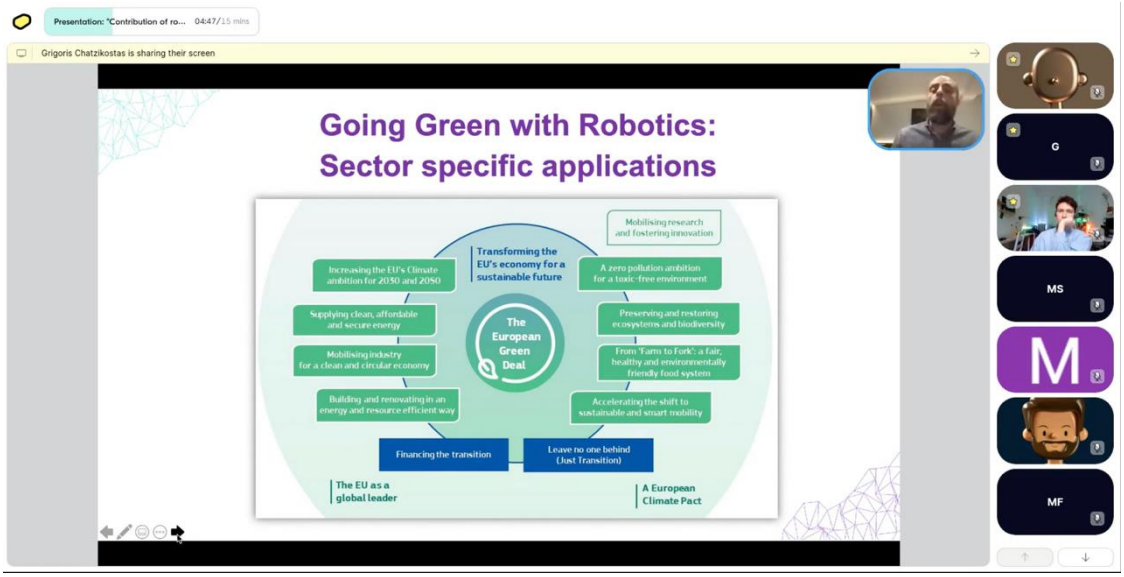

Figure 7 Robotics4EU first agri-food workshop screenshot.

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9.2 The second workshop

Figure 8 Robotics4EU second agri-food workshop screenshot.

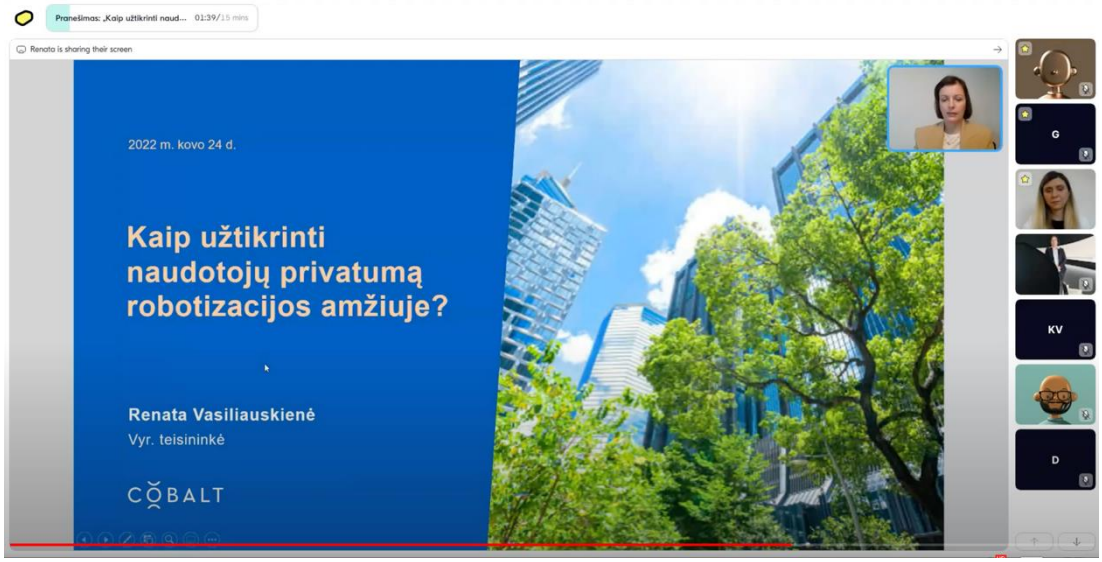

Figure 9 Robotics4EU second agri-food workshop screenshot.

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9.3 The third workshop

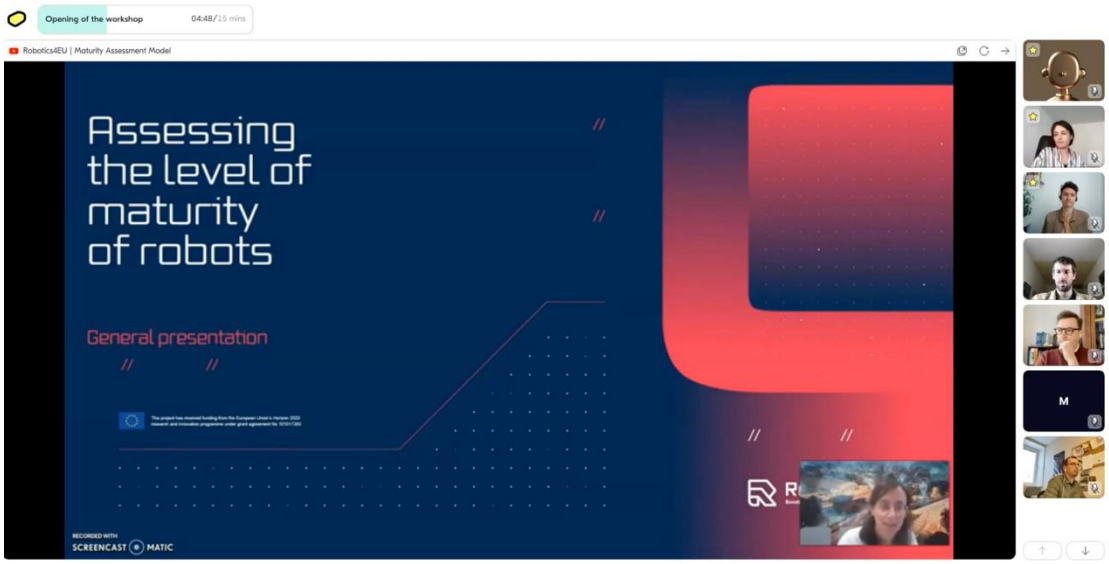

Figure 10 Robotics4EU third agri-food workshop screenshot.

Figure 11 Robotics4EU third agri-food workshop screenshot.

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9.4 The fourth workshop

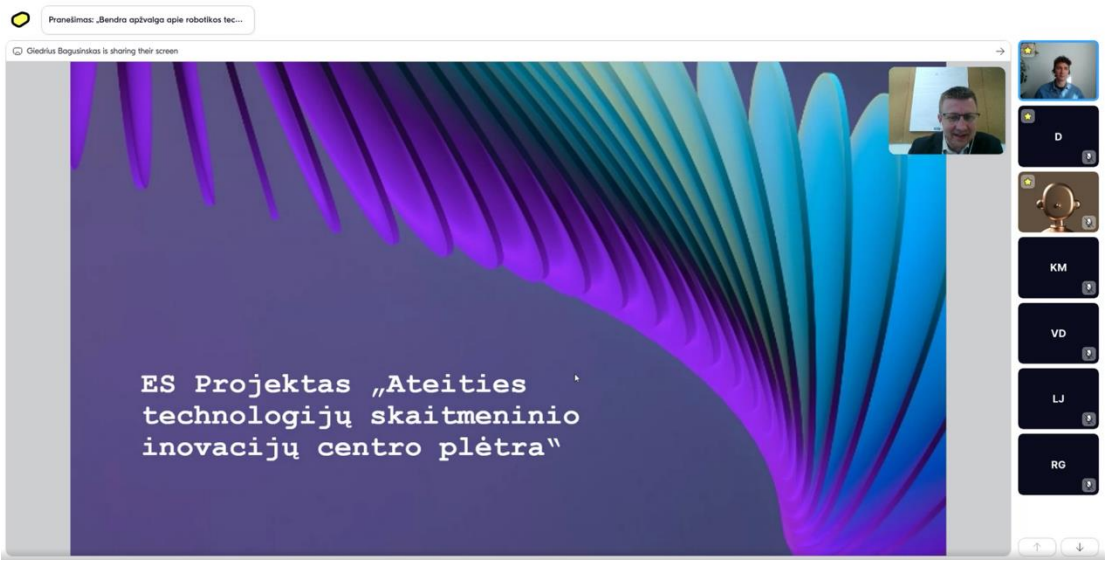

Figure 12 Robotics4EU fourth agri-food workshop screenshot.

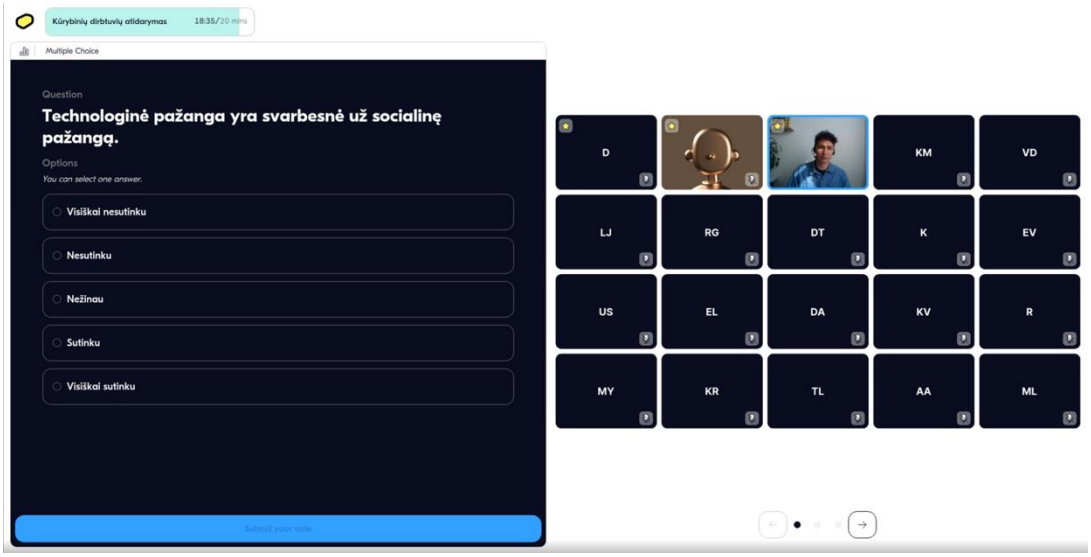

Figure 13 Robotics4EU fourth agri-food workshop screenshot.

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9.5 The fifth workshop

Figure 14 Robotics4EU fifth agri-food workshop picture.

Figure 15 Robotics4EU fifth agri-food workshop picture

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