WS3 Training Programme Protocol

Proceedings of the training sessions in WS3
**Digitalisation in the Bioeconomy:
potentials for rural actors Session #1**

17 January 2024

Monitoring and sensorization of the bioeconomy with digital technologies

The first session of Workstream 3 was held on Tuesday, January 16, 2024, from 9:00 am to 12:00 and welcomed 77 participants who delved into Monitoring and sensorization of the bioeconomy with digital technologies. The agenda for the event encompassed a comprehensive exploration of digitalization within the bioeconomy, featuring distinguished speakers. Katarzyna Kowalska from UNIMOS initiates with an insightful overview, shedding light on the digitalization landscape within the bioeconomy. Frederic Hadjari of IT Cluster – Business Upper Austria follows, delving into the needs and challenges inherent in the digital transformation of the digital region. Katarzyna Kowalska returns to the stage to discuss the application of digital technologies in unlocking the vast potential of biomass. Manuel Pérez, representing the University of Seville, then presents "Future Farm," an exploration of digitalization within the agri-food sector. The agenda concludes with Jon Goriup from VCG.AI GmbH, who introduces the "Value Chain Generator," a smart data platform designed to catalyse the development of the bioeconomy by leveraging intelligent data insights. As with previous sessions, we then delved into country/language specific break out sessions to discuss questions surrounding the technological needs of biomass producers in the respective regions, tools that could fulfil these identified needs and which collaboration partners are necessary to support this transformation.

Description of the **Value Chain Generator:**

is a smart data platform helping companies and regions effectively decarbonise through circular transformation. Users get a clear data-based action plan for the circular development of the most prospective industries and supply chains. It offers a proven pathway to decarbonise, generate more economic value, and reduce waste simultaneously. Value Chain Generator is currently used by regional developers and large organisations in Europe, like Heilbronn Region, WWF, PLU Brewery Heineken, Lombardy Green Cluster, and Chemie Cluster Bayern.

If you are interested in a free Demo of the platform or any further information, please contact Jon Goriup via email: jon@vcg.ai.

BREAK-OUT ROOMS

> **1. What are the main technological or digital needs in the biomass supply chain in your region?**

UPPER AUSTRIA

Whats needed are more companies that offer drone services for agricultural use. At the moment there is only one company in the region of Upper Austria, so the demand of bringing out seeds, especially for intercropping, cannot be met.

There is an immense need of new legislation that aims at these new technologies and their use. For instance a discussion and laws about the use of drones for detecting pests and using pesticides on the spot.

One challenge in bioeconomy that was discussed is the heterogeneity in biomass in general and the difficulty of launching marketable products. Tools from business enterprises my no always have the same goals as the users/the public, etc.

NORTH MACEDONIA

In our region's biomass supply chain, key technological needs include the adoption of remote sensing technologies and drones for crop monitoring, yield prediction, and pest detection. Furthermore, digitalization of greenhouses through smart technologies could improve the agricultural production efficiency. Agri-Weather apps are nice to have in order to offer real-time weather data for informed decision-making on activities like pesticide spraying and frost protection. Also, sensor technologies are crucial for collecting data on soil conditions. The integration of an agricultural stock market could enhance market transparency and facilitates efficient trading. Together, these technological advancements address the region's agricultural challenges and contribute to a more sustainable and productive biomass supply chain.

POLAND

In the Mazovia region of Poland, apple orchards require specific technological and digital solutions to efficiently manage their biomass supply chain. These solutions are necessary to improve sustainability and productivity. Here are some of the technological and digital requirements that are specific to apple orchards in Mazovia:

- Precision Agriculture Technologies:
  - Sensor Technology: Implementing sensors to monitor soil conditions, moisture, and nutrient levels can optimize crop yield by improving precision in irrigation and fertilization.
  - Drones and Satellite Imagery: Using drones and satellite imagery can help identify orchard health issues, such as disease outbreaks or pest infestations.
- Smart Irrigation Systems:
  - Optimizing water usage through real-time data can ensure apple orchards receive the right amount of water at the right time with smart irrigation systems.
- Climate Monitoring and Predictive Analytics:
  - Implementing weather stations and predictive analytics tools can assist orchard managers in making informed decisions related to crop management, harvest timing, and resource allocation.
- RFID and Barcode Technology:
  - Using RFID or barcode tech can improve inventory management and traceability in the supply chain, especially for tracking biomass movement from orchard to processing facilities.
- Biomass Tracking Systems:
  - Tracking biomass production, transportation, and storage with digital systems enhances supply chain transparency, traceability, and sustainability.

Addressing the technological and digital needs can enhance the efficiency, sustainability, and technological advancement of the biomass supply chain in the apple orchards of the Mazovia region in Poland.

FRANCE

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SPAIN

There is a need to improve the supply of technologies and equipment on the market adapted to the specificities of biomass in Andalusia, highlighting the importance of technological solutions adapted to local needs.

There is also a need for pre-treatment of biomass to make its transport cheaper, indicating the need for technologies that enable efficient processing and handling of biomass in the region.

However, Manuel Perez Ruiz, Full Professor at the University of Seville, highlighted the importance of cultural and generational barriers as a key issue to address in order to promote the digital transformation of the biomass value chain.

Agrotech startups are unable to enter the business funnel of biofarming because the decision makers in the agricultural sector are mostly older generations who, in most cases, do not see the applicability of technologies such as drones, IoT, AI, etc. in their agricultural exploitation.

He also highlighted the need for interoperability of the wide range of tools and technologies available at farm level.

Investment and connecting investors, technology and market needs with citizens' understanding and valorisation of bio-based solutions was also highlighted as an important need.

INTERNATIONAL

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2. What actions or tools would be needed to answer those needs?

UPPER AUSTRIA

- More companies or operators of drones that can be used in agriculture for bringing out seeds, detecting weeds and so on.

- Discussion and development of new legislation to meet the new needs of stakeholders who want to use this new technologies.

- Participation in this topic of the government, to offer non-profit driven solutions for applications that are in public interest and cannot or should not be handled by enterprises.

NORTH MACEDONIA

To address the evolving needs in agriculture, the region must focus on three key areas: training for better skills, improved data-sharing platforms, and user-friendly farming tools. Collaboration with tech companies brings innovation to the field. Incentives and partnerships between the public and private sectors encourage progress. Local support from policymakers and communities is crucial for success. In essence, a straightforward and collaborative strategy is essential for the future of agriculture.

POLAND

To address the technological and digital needs of apple orchards in the Mazovia region of Poland, a strategic approach involving various actions and tools is necessary. Here are some recommended actions and tools to fulfill the identified needs:

- Education and Training Programs:
  - Education and training programs need to be offered to farmers to ensure that precision agriculture technologies can be effectively comprehended and utilized by them. To achieve this, workshops, seminars, and online courses should be developed that showcase successful case studies from similar apple orchards where precision agriculture technologies have resulted in increased yield and sustainability.
- Demonstration Projects:
  - Demonstration projects that showcase the practical implementation and advantages of smart irrigation systems are to be established by collaborating with local orchards. The positive impact of optimized water usage on crop health and yield will be demonstrated by utilizing real-time data monitoring and analytics.
- Promotional Campaigns:
  - Promotional campaigns could be launched that highlight the advantages of RFID and barcode technology in inventory management and traceability. Brochures, videos, and testimonials from orchards that have already implemented these technologies could be created, illustrating how they enhance efficiency and transparency throughout the supply chain.
- Government Incentives:
  - Comprehensive proposals could be developed to showcase the long-term benefits of adopting the latest technologies in orchards and advocate for government incentives and subsidies. The positive impact of these technologies on the environment, economy, and overall sustainability should be emphasized in the proposals. Success stories and data from early adopters will be used to strengthen the case.

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SPAIN

In terms of actions:

- Capacity building and promotion of intergenerational dialogue and cooperation is seen as a way to bridge the gap between decision makers (currently mostly older generations) and innovators, start-ups and younger generations trying to develop digitalisation tools to integrate agriculture (olive tree biomass) and technology.
- Develop alliances between academia, the biomass value chain and technology providers to develop tools to measure the quality and volume of olive tree biomass to optimise storage and transport.
- Promoting impact investment, focusing not only on financial returns but also on the environmental and social impact and the role that biomass can play in it, to support start-ups and open innovation in bio-based solutions enabled by technology that can be linked to market needs and consumer valorisation (raising awareness of bio-based products).
- Developing a common language that can facilitate the integration of technology at farm level and the valorisation of bio-based products by consumers, for which Digital Innovation Hubs are seen as a key catalyst, as well as promoting and raising awareness of the bioeconomy.

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3. Collaboration between which entities and stakeholders of biomass supply chain is crucial to support its digitalization?

UPPER AUSTRIA

As the development of the legislation is lacking behind, a collaboration between government, stakeholders, research/universities and business companies is needed.

NORTH MACEDONIA

For a successful digitization of the biomass supply chain, different groups need to work together. The Ministry of Agriculture gives direction and guidance, as well as legal foundation, while the financial agency provides funding much needed for digitization. Moreover, the Hydro-meteorological Service helps with real-time data like weather. Nonetheless, AgTech start-ups could bring new ideas for efficiency. Additionally, farmers' organizations make sure the efforts match real needs. Research institutions help develop and improve digital tools. This collaboration ensures a balanced approach, using policy, money, technology, practical insights, and academic knowledge for better biomass management.

POLAND

In order to promote the digitalization of the biomass supply chain in the Mazovia region of Poland, especially in the context of apple orchards, it is essential to encourage collaboration

among different stakeholders and key entities. This will require the active participation and cooperation of clusters, technology companies, national and regional institutions, and organizations such as UNIMOS. The synergy among these diverse entities will play a crucial role in driving the successful implementation of digital technologies throughout the supply chain.

To encourage local farmers in the region to adopt these technological advancements, a multifaceted approach is necessary. This approach should include making financial support available to alleviate the initial costs and incentivize the adoption of new technologies. At the same time, a focus on education and training programs is essential to empower farmers with the knowledge and skills required to effectively integrate digital tools into their orchard management practices. By addressing both the financial and knowledge barriers, a collaborative effort among these stakeholders can pave the way for the widespread digitalization of the biomass supply chain in Mazovia.

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SPAIN

María Nieto Fajardo of SANDETEL stressed the importance of all stakeholders in the quintuple helix: academia, public authorities, industry and biomass producers, investors and the financial sector, the third sector, citizens themselves and environmental organisations. Multi-level cooperation at national, regional and local level is crucial for the digitalisation of the sector; the public sector can play an important role in facilitating dialogue, promoting regulatory frameworks that encourage digitalisation and investment, and raising awareness.

She stressed the importance of engaging agro-tech start-ups in open innovation projects to stimulate the digitalisation of the biomass value chain, addressing the identified need for interoperability and solving critical challenges such as storage and transport. In this context, she mentioned a forthcoming programme of the Andalusian Digital Agency, the Digital Entrepreneurship Network, which will have a dedicated agri-tech pillar.

INTERNATIONAL

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Cross-regional conclusions/learnings

In Upper Austria, there's a notable demand for more drone service companies in agriculture, with only one currently available, leading to unmet needs in seed distribution, particularly for intercropping. Additionally, new legislation is required to address the use of drones for pest detection and pesticide application. In North Macedonia, technological advancements such as remote sensing technologies, drones for crop monitoring, and smart greenhouse technologies are seen as crucial for enhancing agricultural production efficiency and supply chain transparency. In Poland's Mazovia region, specific technological solutions like precision agriculture technologies, smart irrigation systems, climate monitoring tools, and biomass tracking systems are identified as essential for managing apple orchards effectively and sustainably. In Andalusia, Spain, there's a need for technologies tailored to local biomass specificities and improved pre-treatment methods to reduce transportation costs. Cultural and generational barriers to adopting agrotech

solutions are highlighted, along with the importance of interoperability among different tools and technologies at the farm level, as well as investment and market connection for bio-based solutions.

In Upper Austria, there's a pressing need for more drone operators in agriculture, accompanied by discussions on new legislation to accommodate these technologies. In North Macedonia, the focus is on enhancing agricultural practices through improved training, data-sharing platforms, and user-friendly farming tools, emphasizing collaboration with tech companies and public-private partnerships. For apple orchards in Poland's Mazovia region, strategies include education programs, demonstration projects, promotional campaigns, and government incentives to adopt precision agriculture technologies effectively. In Spain, efforts are directed towards bridging the gap between decision-makers and innovators through capacity building, fostering alliances to optimize biomass storage and transport, promoting impact investment in bio-based solutions, and developing a common language for technology integration and consumer awareness in the bioeconomy.

In Upper Austria, collaboration is needed among government, stakeholders, research, and businesses due to slow legislation development. In North Macedonia, successful biomass supply chain digitization requires coordination between various entities like the Ministry of Agriculture, financial agencies, AgTech startups, farmers' organizations, and research institutions. In Poland's Mazovia region, promoting digitalization involves collaboration among clusters, technology firms, and financial support for farmers. In Spain, multi-level cooperation among academia, public authorities, industry, investors, and startups is crucial, with a focus on open innovation projects to address challenges and promote interoperability in the biomass value chain.

Participant feedback

At the end of the training session, the participants were asked to fill in a short survey to evaluate the training session. In the end, 9 participants responded to the survey, of which 2 from Poland, 2 from Spain, 1 and 1 from Macedonia. Additionally, 4 participants answered the English survey. This gave the following results:

Quality

The participants were asked to rate the quality of the training session on a scale from 1 (poor) to 4 (excellent). All of the 9 participants answered this question with a 4, meaning they found the training session to be of excellent quality.

How would you rate the quality of the training session?
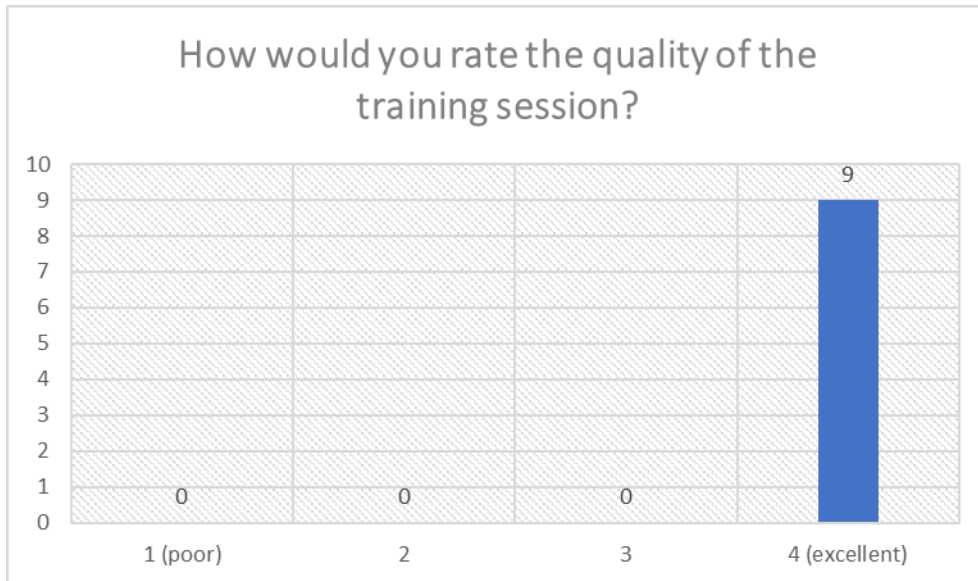
The participants were then asked what went well during the session. Multiple participants answered that they found everything to have gone well. Additionally, the presentations, contents, topics, and discussions were found to be very interesting by the respondents. Lastly, the great moderation was also mentioned.

Next, the participants were asked what could have gone better. Most of the participants mentioned that everything went great, and they had no further comments. One participant mentioned that there were some technical issues. Another participant suggested the use of Zoom as a good alternative to Microsoft Teams. The integration of Latin America was also mentioned.

Understandability

The participants were also asked whether the presentations were easy to follow. They were asked to rate this on a scale from 1(with difficulty) to 4 (easily). Out of the 9 participants, 8 gave this a score of 4 (easily), and 1 participant a score of 3.

Were the presentations easy to follow?
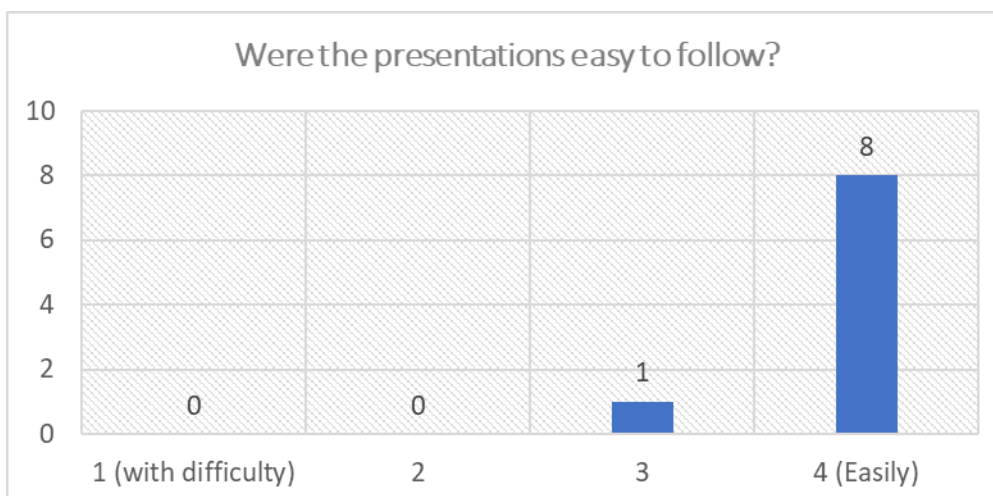
Topics

When asked which topic was most interesting, we received the following answers:

- Data capture technologies (sensors) and information processing
- Digital technology
- Presentation from UNIMOS, general overview and examples for different value chains.
- Digitalization (for agriculture in general)

In the general comment box, one comment was made that said: "Analysis of bioeconomy from thermodynamics".

Field of occupation

The survey concluded with an optional question regarding the participant's field of occupation. The participants came from different areas; 3 from research, 2 from agriculture, and one from food, forestry, and public administration.
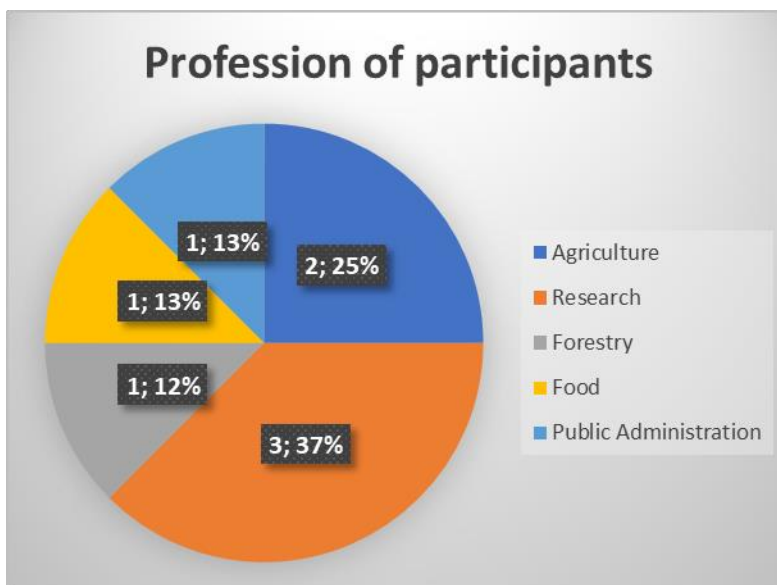
Participants:

If you wish to get in touch with one of the participants from this session, please contact someone in the SCALE-EP consortium.

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