MAINSTREAM BIO

MAINSTREAMING SMALL-SCALE BIO-BASED SOLUTIONS ACROSS RURAL EUROPE

D4.4

Practice abstracts - Batch 1

AUP

14/06/2024

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ABBREVIATIONS

AUP	Agricultural University of Plovdiv
EIP AGRI	Agricultural European Innovation Partnership
KPI	Key Performance Indicator
M	Month
MIP	Multi-actor Innovation Platform
PA	Practice Abstract
WP	Work Package

Executive Summary

The instruments to efficiently disseminate good practices in the Bioeconomy sectors to farmers and industry are Practice Abstracts (PA) and communication and educational materials (including audio-visual material) that can help enhance awareness and understanding of the bioeconomy, more specifically at rural and regional level.

The Deliverable 4.4 presents practice abstracts, which were developed in accordance with the T4.5 Production of practice abstracts, audio-visual material and contributions to the Knowledge Centre for Bioeconomy.

The Practice abstracts provide practical guidelines to rural stakeholders along with lessons learnt from practice, recommendations and tools that will help interested regional actors (e.g., clusters, innovation hubs, advisors) in adapting and adopting MainstreamBIO' results to set up MIPs and/or better attune their innovation support towards mainstreaming small-scale bio-based solutions.

The report presents the first 8 of the foreseen practice abstracts, which were produced by the MainstreamBIO partners in the form of summaries for practitioners using the EIP-AGRI common format as intended in the DoA.

The practice abstracts will contribute to achieve the project **Objective 4 (O4):** ***Evaluate results and use evidence to drive multi-actor dialogues, peer learning and knowledge transfer, delivering guidelines and recommendations for replication in rural areas across Europe.*** Accordingly, the WP4 aims to validate the performance and impact of MIPs services and tools, producing quantifiable evidence in the process, to be used to evaluate the project results and gain insights into what seems to be working (or not) and under what circumstances. With these insights as baseline, the aim is to **engage regional stakeholders** to co-define pathways for further scaling up solutions towards the development of inclusive and circular local bioeconomies, before employing the accumulated regional experiences as a platform for cross-regional mutual learning and knowledge exchange. The transferability of project results will be supported by providing practical tools (replication guide, policy recommendations, **practice abstracts**) and data (via open access repositories) that inspire and facilitate their application in other rural areas.

These PAs are intended to contribute to the Knowledge Centre for Bioeconomy, other centres and networks for dissemination of bioeconomy knowledge, 'sister' projects, education and AKIS networks, etc. along with other results and data from the project. The PAs as well as an overview of other contributions will be prepared by AUP and integrated in D4.2.

1. Introduction

➢ Practice Abstracts:

The **practice abstracts (PA)** are among the most efficient instruments for communication and dissemination offering practical knowledge for rural actors to better understand how they can adopt small-scale bio-based solutions. By summarising and showcasing good examples, the MainstreamBIO PAs will **inspire and support a wider group of rural actors across Europe to cooperate** and **bring bio-based innovation to market**, sustainably creating and walking down their own business model pathways.

The project PAs are prepared by using the European Innovation Partnership AGRI (EIP-AGRI). It is a thematic network helps projects to work in synergy with other interactive innovation projects under the Framework Programme “Horizon”. These Horizon "multi-actor projects" and "thematic networks" act at EU level and bring together partners from at least three countries. All Horizon multi-actor projects and thematic networks as well as all EIP-AGRI Operational Groups use the common format to provide farmers, foresters, advisers or whoever is interested with short and concise practical information (so called 'practice abstracts'). Links to audio-visual material (photos, films, etc.) are included as much as possible. The use of the EIP-AGRI common format facilitates not only the exchange of knowledge, but also the contact between potential partners in innovation projects https://ec.europa.eu/eip/agriculture/en/content/eip-agri-common-format.ht. It contributes to building up a unique repository of practical knowledge across the EU via the EIP-AGRI project database, which supports the dissemination of results of all interactive innovation projects.

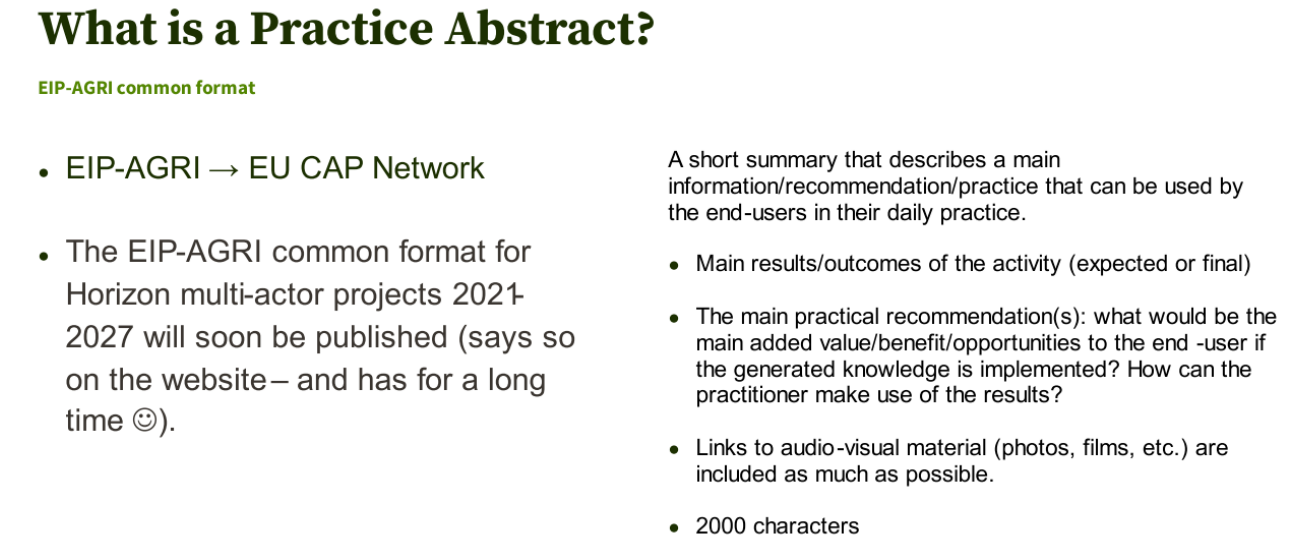

Figure 1: What is a Practice Abstract?

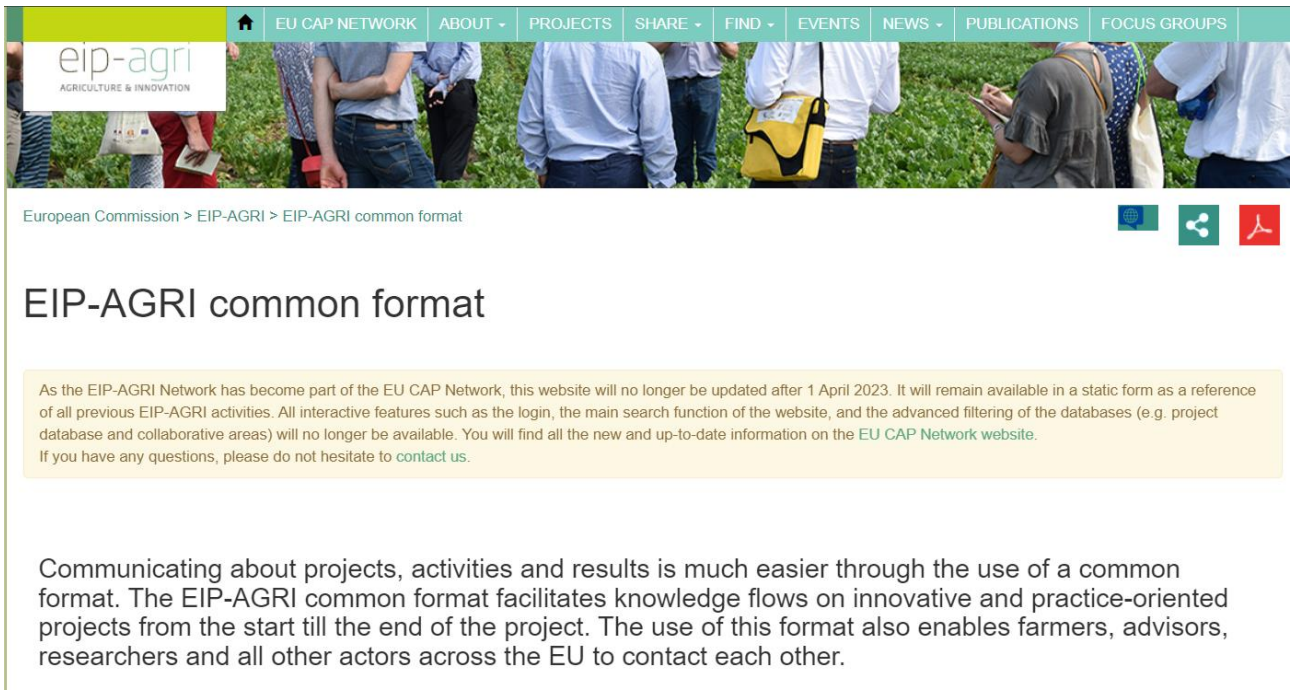

Figure 2: The message from the EIP-AGRI website

Within the framework of the WP4 of the MainstreamBIO, the Task 4.5 led by the AUP, observes the development at least 30 PAs contributing for more efficient adoption of small-scale biobased solutions and nutrient recycling practices. Accordingly, the project PAs are based on cases (good practices) that are supported by MIPs in each partner country to showcase *inter alia* small-scale bio-based (digital) technologies and good nutrient recycling practices, business models, multi-actor Innovation platforms or social innovations (see Annex 2). The PA content is presented using the EIP-AGRI common format (see Annex 1 the reporting template). Also, each project partner commits to prepare at least one audio-visual showcase, presenting their activities with testimonials from stakeholders. All these communication and dissemination materials as well as an overview of the partners' contributions should be processed and summarised by the AUP.

A structured approach has been used for selection of the most suitable PAs. A clear selection process for PAs, based on selection criteria such as the relevance of their content regarding the four selected topics of interest (see Annex 2), has been introduced to the project partners (see Fig.3 below). The process includes also an internal quality assurance procedure for the PAs.

Selection and elaboration process of the PAs

A common process has been followed for selecting the PAs. A straightforward five-step procedure is presented in the figure that follows, outlining all steps from the identification of PAs to their delivery.

It should be noted that the selection of the PAs for the 1st batch was derived mainly from the expertise of the consortium partners since there were no evident results from the various project activities to be highlighted. In the 2nd batch, results from specific project activities will be transferred into practice-oriented PAs. Some indicative Tasks which will fuel the 2nd batch of the PAs are:

- T3.3 - Delivery of innovation support services to enhance the market uptake of small-scale bio-based solutions.

- T3.5 - Awareness raising campaigns and educational activities to enhance the understanding of bioeconomy.
- T5.4 - Business planning for the MIPs and toolkit.

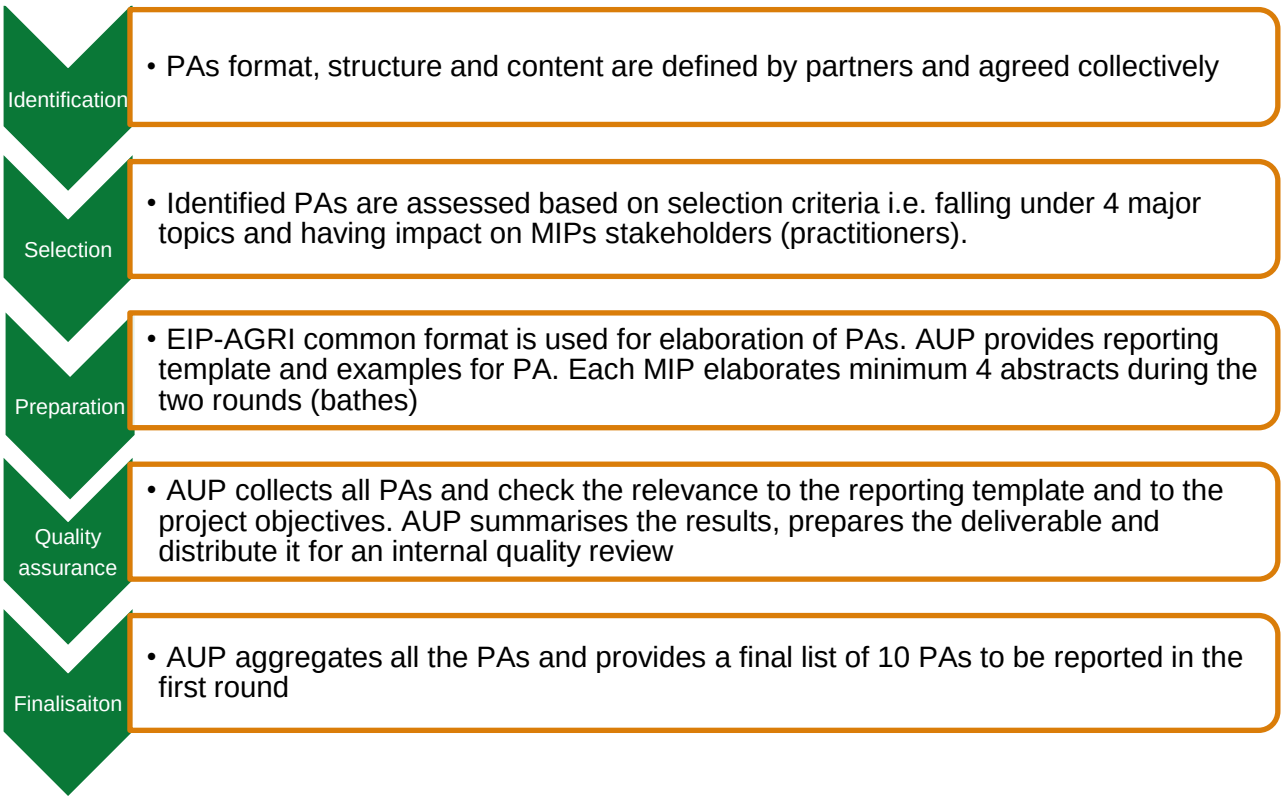

Figure 3: Selection and elaboration process of PAs

Identification. PAs topics of interest are identified collectively and agreed by partners. Each MIP provide topic and short description of PAs.

Selection. Identified PAs are assessed based on the following selection criteria: (1) relevance of PA to a small-scale bio-based solution and (2) relevance of PA to nutrient recycling practice.

Preparation. AUP provides a reporting template to each MIP in order to share and complete the selected PA. The template is based on EIP AGRI common format (see Annex 1 “Practice abstract reporting template, MIP, Bulgaria). Each MIP is responsible to deliver the reporting template with the selected PA. Each MIP elaborates minimum 4 PAs divided into 2 batches. First batch consist of 10 abstracts (at least) collected during the first round (From month 1 to month 12).

Quality assurance. MIPs are responsible to provide on time the agreed PAs to the partner AUP. The AUP checks the PAs for relevance to the EIP-AGRI format as well as to the project objectives. The AUP then distributes the collected PAs for internal quality review across project partners and the management. The quality of PAs is checked by quality reviewers from FBCD, IUNG and Q – Plan international.

Finalization. Upon completion of the quality review, all the reviewed PAs are collected by AUP. AUP integrate at least 10 PAs in the deliverable within the first round.

Expected impact

The PAs perceived as an instrument for communication and for education that can help enhance awareness and understanding of the bioeconomy. The WP4 team could not predict what would be

the future of the EIP-AGRI practice abstracts as an instrument back in 2022. Although the indicated website for the EIP-AGRI project database informs that the website is no longer updated since April 2023, and therefore the claimed interaction with the EIP-AGRI project database is not possible, the WP4 team decided to keep the EIP-AGRI practice abstracts format, because of its simplicity and the opportunity to be shared with other networks, databases, projects, AKIS, etc. Thus, the target groups to be approached are the farmers and industry, agri-food clusters, (digital) innovation hubs, rural development and innovation agencies, local agri-food decision-makers, regional and national authorities, the research community (in relevant fields of the bioeconomy domain), citizens and consumers. It is another contribution along with the project Digital toolkit, the Catalogue of small-scale bio-based technologies, business models and social innovations, the BioForum platform, and the Bioeconomy Repository. The PAs and videos from MainstreamBIO will be disseminated to other (sister) projects, networks and initiatives such as the TRANSITION2BIO, COOPID, AGRIFORVALOR, BIOSWITCH, ICTBIOCHAIN bioresource mapping tool, BIOEASTUP Virtual Toolbox, AGRIFORVALOR side stream value tool, BIOSWITCH toolbox, POWER4BIO catalogue, GO-GRASS Toolbox, AGROINLOG IBLC tool etc. All project partners commits to contribute to the Knowledge Centre for Bioeconomy, using their dissemination channels such as *inter alia* EU-CAP network, through key social media (Facebook, Twitter, LinkedIn and YouTube), MIPs co-creation workshops, capacity building workshops, networking and demo- days, awareness raising and educational events, mutual learning workshops, etc.

The AUP should report the selected PAs with relevant information/recommendation/practice for serving the MIPs practitioners in two rounds (batches) with 10 and 20 PAs respectively (i.e. in two dedicated deliverables in M12 and M34).

Upon completion of the selection process and the quality review, and also having regard to the fact that the MIPs were in their initial stage of development during the first half of the project, the partners have been able to present only 8 PAs in the first batch. The project partners declared their commitment to present the outstanding 22 PAs together with the 10 audio-visual showcase in the second half of the project.

2. Task 4.5 Objectives and Progress against KPIs

- Objectives
  - Prepare practice abstracts and showcase for adopting small-scale bio-based solutions and nutrient recycling practices.
- Deliverables
  - D4.4 Practice abstracts - Batch 1 (M12, Report, PU, AUP)
  - D4.5 Practice abstracts - Batch 2 (M34, Report, PU, AUP)
- KPIs
  - At least 10 abstracts in M12
  - At least 20 abstracts in M34
  - Each MIP will prepare at least 1 audio-visual showcase, showcasing their activities with testimonials from stakeholders.
- Progress against the KPIs

Table 1: Progress against the KPIs

KPIs	Progress against the defined KPIs
at least 10 abstracts in M12	Delivered 8 Practice abstracts
at least 22 abstracts in M34	To be delivered in second round

3. Task 4.5 Approach and methodology

The following methodology and procedures has been followed, under the coordination of Task 4.5 leader AUP, in order to compile and collect the PAs.:

- According to the DoA of th GA, the consortium partners and the WP 4 team members should prepare and presente a total of 30 PAs falling under four major horizontal topics of interest related to the project objectives (see Annex 2).
- Each project partner completes a minimum of four PAs during the two rounds (at M12 and M34).
- During several online meetings, the partners agreed on the format of the PAs and the four major topics and subtopics.
- The team has decided to keep the EIP AGRI format as stated in the Grant Agreement (WP4 T4.5) https://ec.europa.eu/eip/agriculture/en/content/eip-agri-common-format.html
- All MIP leaders have been instructed to discuss with the stakeholders and prepare a PA, which contains a short summary of around 1000-1500 characters (see Annex 1. Practice Abstracts Reporting Template). Few examples of existing PAs in the EIP-AGRI network have been provided to the partners for a reference.
- The partners have been advised to use Guidance and template for the practice abstracts available on the EIP AGRI website: https://ec.europa.eu/eip/agriculture/en/eip-agricommon-format
- The Task 4.5 leader provided description to all partners on the type of the most relevant information/recommendation/practice the PA should contain in order to serve and help the end-users in their daily practice.
- All partners have been requested to produce and provide at least 4 such PAs in English and in their native language until the end of the project (see also Annex 1).
- The information in the PAs could contain a "showcase" from the MainstreamBio target region concerning one of the following themes, *inter alia*:
  - ✓ small-scale bio-based technologies, business models, social innovations and good nutrient recycling practices;
  - ✓ tailored business and technical services provided by experts in the bioeconomy domain;
  - ✓ practical digital tools to support deployment of small-scale bio-based solutions;
  - ✓ showcases describing the model-example of farmers, foresters and biomass producers, bioeconomy value-chain actors, or/and in collaboration with regional and local decision- or/and policy- makers, social groups, etc.
- The topic of the partner PA should fall under one of the groups of horizontal topics and sub-topics relevant at the partners' local/regional for adopting small-scale bio-based solutions and nutrient recycling practices/cases (see Annex 2 "Topics and titles of PAs – Batch 1") i.e.:

  How the MIP support small-scale bio-based technologies, business models, social innovations and good nutrient recycling practices?

- ✓ Provision of consultancy/advice on concrete technological solutions and their adaptation
- ✓ Advice on organisational and coordination aspects
- ✓ Advice and management of the IPR

How the MIP supports provision of tailored business and technical services by experts in the bioeconomy domain?

- ✓ Approaches and instruments for transfer and/or provision of knowledge and know-how on e.g. nutrient recycling, waste biomass valorisation, renewable energy production and use, biological agricultural inputs (bio-fertilisers, bio-pesticides), biorefining, etc.
- ✓ Social innovations and tools to address e.g. rural development of Less-Favoured Areas (LFA), approaches of Local Action Groups (LAGs), etc.
- ✓ Quadruple Helix models and MIPs as innovation brokers by using e.g. NGOs, branch associations, LAGs, municipality policy-makers, industry producer groups (cooperatives), research entities, education entities, etc., for implementation of innovations.

How the MIP supports provision, adaptation and/or adoption of digital technologies by small-scale bio-based entities

- ✓ Practical digital tools to support the deployment of small-scale bio-based solutions e.g. Integrated pest management (IPM), fertiliser applications, reduction of GHG emissions, conservation tillage, etc.
- ✓ Practical description of technique to support the deployment of small-scale bio-based solutions within e.g. Integrated pest management (IPM), fertiliser applications, reduction of GHG emissions, conservation tillage, etc.

Multi-actor Innovation platforms for mainstreaming bioeconomy in rural areas

- The following schedule have been provided to MIP leaders:

Table 2: Action plan for the provision of 1st batch of the PAs

#	Action Point	Who	By When
	Action to be performed	**Partner/Partners**	**DD/MM/YYYY**
1	First draft of Practice Abstract 1 per MIP	MIPs	30/03/2023
2	D4.4 – Practice abstracts batch 1 (min. 10 abstracts) M12	AUP	10/8/2023

Issues discussed

- Issue 1: Topics to be included in the Practice abstracts (PA) and the PA structure.
- Issue 2: Deadline of providing the first draft of PAs – final deadline for finished abstract by when?
- Issue 3: How to allocate 10 abstracts among 7 MIPs (batch 1 by M12)

Meetings performed

Most of the meetings have been performed online. They have been focused on consultation on the format, structure, topics of PAs, their visualization and the deadlines. Other discussion topics included who should finalize the first batch. It was discussed that the topics of the first batch could be extended to cover not only small scale practices/technology description per se but also process descriptions within the project. Thus, all partners were involved in preparing the first 10 PAs.

Besides the regular consultations with the WP4 leader, there have been regular online meetings with coordinators of the MainstreamBIO through monthly calls e.g. on the 26th of April 2023.

4. Inferences

The regular meetings and discussions with partners contributed for more clear and concrete guidance on how to collect, compile and disseminate the first 8 practice abstracts to facilitate adoption of small-scale bio-based solutions and nutrient recycling practices based on the cases supported by the project MIPs.

The analysis of the prepared PAs (see Annex 1) shows that the knowledge transfer flow through:

- the MIP supports to provide tailored business and technical services by experts in the bioeconomy domain through instruments methodologies for Mapping and Analysis of Regional Bio-based Value Chains (MTU) as well as through social innovations such as the Alcarràs Bioproductors SAT - Farmers join forces and propel bioeconomy (INNV);
- the MIP supports to provide, adapt and/or adopt digital technologies and technical descriptions by small-scale bio-based solutions for e.g. Integrated pest management (IPM), fertiliser applications, reduction of GHG emissions, conservation tillage, etc. such as the INTER-NAW application for fertilization plan and nutrients accounting (IUNG), Viticultural business face to face with digitization and science (AUP), Ecorobotix the future sprayer (FBCD), HTL pilot plant (PROC) Anaerobic digestion (WR).

The practice abstracts thus contribute to achieving the project **Objective 4 (O4):** ***Evaluate results and use evidence to drive multi-actor dialogues, peer learning and knowledge transfer, delivering guidelines and recommendations for replication in rural areas across Europe.***

The first batch of eight PAs showcase examples that could be replicated and adopted by the target stakeholders in the partner countries. The PAs will contribute to a more efficient uptake of bio-based innovation to market, by sharing the experience and know-how of the regional specific business models by a wider group of rural actors across Europe. The PAs will contribute to the Knowledge Centre for Bioeconomy and integrated in D4.2.

5. Annexes

Annex 1. Practice abstracts Reporting Template – MIP, Bulgaria

Practice "abstract" 1:	*Several practice abstracts may be needed for one project, depending on the size of the project and the number of outcomes/recommendations which are ready for practice.*
Short title in English	Viticulture business face to face with digitization and science
Short summary for practitioners in english on the (final or expected) outcomes (1000-1500 characters, word count – no spaces). *Do not complete if the summary below is completed in English* This summary should at least contain the following information: − Main **results/outcomes** of the activity (expected or final) − The **main practical recommendation(s)**: what would be the main added value/benefit/opportunities to the end-user if the generated knowledge is implemented? How can the practitioner make use of the results? This summary should be as interesting as possible for farmers/end-users, using a direct and easy understandable language and pointing out entrepreneurial elements which are particularly relevant for practitioners (e.g. related to cost, productivity etc). Research oriented aspects which do not help the understanding of the practice itself should be avoided.	The EU Green Deal ad the EU F2F Strategy requires novel approaches by primary biomass producers. Smart Farming solutions are a global trend. Decision Support Systems (DSS) are ever relying on AI and precision agriculture tool employing remote sensing of environmental conditions and combining them with prediction models. The company BeVine (https://bevine.wine/en/about-us/) provides such technology for grape- and wine-growers that may achieve 20% spraying saving, 90% accuracy of disease prediction models, and 30% savings on scouting expenses. BeVine collaborates with the Agricultural University in Plovdiv (AUP) using its scientific resources and infrastructure of universities to compile a novel DSS for winegrowers who want to optimize their production costs and get quality yield. This collaboration is included in the Bulgarian MIP and will continue to a) provide the DSS to grape- and wine-farmers, b) execute capacity building through training courses and c) teach students and researchers. It creates a network of cooperation between the agricultural sector, digital technology professionals, and scientists thus demonstrating in pracice the Quadruple Helix concept. It is financially supported by an EU-funded project AgroDigiRise. The remote access and daily monitoring of thousands of acres of strategic crops such as grapes is entirely feasible. Farmers are provided with the opportunity to “test before invest,” and receive a "tailor-made" expert advice on their individual functionality of technological solutions. The collaboration with experts who possess extensive experience in agronomy and a well-equipped university base are essential for collecting useful data and conducting innovative research in this field. The climate monitoring stations are being installed in the experimental grape yards of the AUP, located above the village of Bresnik, Plovdiv region. Parameters such as air and soil temperature and humidity, precipitation amount, wind speed, and direction will be monitored with aim to determine the microclimate in vineyards and analyze differences of temperature and humidity between the air and the vines themselves. Sensors, placed in three locations within the grape arrows, are detecting these data to better understand the effects of these factors on the vine plants. Additionally, a comprehensive understanding of the most econommically impactful grape diseases will be achieved by studying pathogen development within the vines throughout the year in relation to the pheno-phases of the corresponding grape varieties. The company software will process and analyze the collected data and visualizing it through a mobile application. The obtained information will assist farmers in increasing their yields, as well as improving the safety and quality of their harvest. Researchers from the AUP will conduct demonstrations to help

	interested farmers familiarize themselves with the functionality of the intelligent vineyard management software, which facilitates remote monitoring and smart grape cultivation.
Short title in native language	Лозарския бизнес лице в лице с цифровизацията и науката
Short summary for practitioners in native language (*can be the language of the coordinator / one of the partners - otherwise in English*) (1000-1500 characters, word count – no spaces). This summary should at least contain the following information: − Main **results/outcomes** of the activity (expected or final) − The **main practical recommendation(s)**: what would be the main added value/benefit/opportunities to the end-user if the generated knowledge is implemented? How can the practitioner make use of the results? This summary should be as interesting as possible for farmers/end-users, using a direct and easy understandable language and pointing out entrepreneurial elements which are particularly relevant for practitioners (e.g. related to cost, productivity etc). Research oriented aspects which do not help the understanding of the practice itself should be avoided.	Зелената сделка на ЕС и Стратегията От фермата до Трапезата" на ЕС изискват нови подходи от страна на производителите на първична биомаса. Решенията за интелигентно земеделие са световна тенденция. Системите за подпомагане на вземането на решения (DSS) винаги разчитат на Изкуствения Интелект (AI) и инструментите за прецизно земеделие, използващи дистанционно наблюдение на условията на околната среда и комбинирането им с модели за прогнозиране. Компанията BeVine (https://bevine.wine/en/about-us/) предоставя такава технология за производителите на грозде и вино, която може да постигне 20% спестяване на пръскане, 90% точност на моделите за прогнозиране на заболявания и 30% спестяване на разходите за мониторинг. BeVine си сътрудничи с Аграрния университет в Пловдив (АУП), използвайки своите научни ресурси и инфраструктура на университетите, за да състави нов DSS за лозари, които искат да оптимизират производствените си разходи и да получат качествен добив. Това сътрудничество е включено в българска Мулти-иновационна Платформа и ще продължи да а) предоставя DSS на лозари и винопроизводители, б) да извършва изграждане на капацитет чрез курсове за обучение и в) да обучава студенти и изследователи. Той създава мрежа от сътрудничество между селскостопанския сектор, професионалисти в цифровите технологии и учени, като по този начин демонстрира на практика концепцията Quadruple Helix. Финансирана е от проект на ЕС AgroDigiRise. Отдалеченият достъп и ежедневното наблюдение на хиляди декари със стратегически култури като гроздето е напълно осъществимо. На фермерите е предоставена възможност да „тестват преди да инвестират“ и да получат „специализирани“ експертни съвети относно тяхната индивидуална функционалност на технологичните решения. Сътрудничеството с експерти с богат опит в агрономията и добре оборудваната университетска база са от съществено значение за събирането на полезни данни и провеждането на иновативни изследвания в тази област. Станциите за климатичен мониторинг се монтират в опитните лозя на АУП, разположени над с. Брестник, област Пловдив. Ще се наблюдават параметри като температура и влажност на въздуха и почвата, количество на валежите, скорост и посока на вятъра, за да се определи микроклимата в лозята и да се анализират разликите в температурата и влажността на въздуха и самите лозя. Сензори, поставени на три места в рамките на гроздовите стрелки, ще открият тези данни, за да разберат по-добре ефектите от тези фактори върху лозовите растения. Освен това ще бъде постигнато цялостно разбиране на най-икономически въздействащите болести по гроздето чрез изучаване на развитието на патогени в лозите през цялата година във връзка с фенофазите на съответните сортове грозде. Фирменият софтуер ще обработва и анализира събраните данни и ще ги визуализира чрез мобилно приложение. Получената информация ще помогне на фермерите да увеличат добивите си, както и да подобрят

	безопасността и качеството на реколтата. Изследователи от АУП ще проведат демонстрации, за да помогнат на заинтересованите фермери да се запознаят с функционалността на софтуера за интелигентно управление на лозята, който улеснява дистанционното наблюдение и интелигентното отглеждане на грозде.

Annex 2. Topics and titles of PAs – Batch 1

Topics and Titles of PAs	
Horizontal topics and sub-topics	*A total of 30 PAs within these topics (Each MIP completes minimum 4 abstracts during the two rounds (M12 and M34) within the horizontal topics.*
	Title of PA
1. How the MIP support small-scale bio-based technologies, business models, social innovations and good nutrient recycling practices?	
1.1. Provision of consultancy/advice on concrete technological solutions and their adaptation	
1.2. Advice on organisational and coordination aspects	
1.3. Advice and management of the IPR	
2. How the MIP supports provision of tailored business and technical services by experts in the bioeconomy domain?	
2.1. Approaches and instruments for transfer and/or provision of knowledge and know-how on e.g. nutrient recycling, waste biomass valorisation, renewable energy production and use, biological agricultural inputs (bio-fertilisers, bio-pesticides), biorefining, etc.	A Methodology for Mapping and Analysis of Regional Bio-based Value Chains (MTU)
2.2. Social innovations and tools to address e.g. rural development of Less-Favoured Areas (LFA), approaches of Local Action Groups (LAGs), etc.	Alcarràs Bioproductors SAT - Farmers join forces and propel bioeconomy (INNV)
2.3. Quadruple Helix models and MIPs as innovation brokers by using e.g. NGOs, branch associations, LAGs, municipality policy-makers, industry producer groups (cooperatives), research entities, education entities, etc., for implementation of innovations.	Apadrina un Olivo - Social innovation against rural depopulation (INNV)
3. How the MIP supports provision, adaptation and/or adoption of digital technologies by small-scale bio-based entities	
3.1. Practical digital tools to support the deployment of small-scale bio-based solutions e.g. Integrated pest management (IPM), fertiliser applications, reduction of GHG emissions, conservation tillage, etc.	INTER-NAW application for fertilization plan and nutrients accounting (IUNG) Viticulture business face to face with digitization and science (AUP)

3.2. Practical description of technique to support the deployment of small-scale bio-based solutions within e.g. Integrated pest management (IPM), fertiliser applications, reduction of GHG emissions, conservation tillage, etc.	Ecorobotix the future sprayer (FBCD) HTL pilot plant (PROC) Anaerobic digestion (WR)
4. Multi-actor Innovation platforms for mainstreaming bioeconomy in rural areas	

Annex 3. Partners' Practice Abstracts

PA1

Title: Viticultural business face to face with digitization and science

Author: AUP, Bulgaria

The EU Green Deal and the EU F2F Strategy requires novel approaches by primary biomass producers. Smart Farming solutions are a global trend. Decision Support Systems (DSS) are ever relying on AI and precision agriculture tool employing remote sensing of environmental conditions and combining them with prediction models. The company BeVine (https://bevine.wine/en/about-us/) provides such technology for grape- and wine-growers that may achieve 20% spraying saving, 90% accuracy of disease prediction models, and 30% savings on scouting expenses. BeVine collaborates with the Agricultural University in Plovdiv (AUP) using its scientific resources and infrastructure of universities to compile a novel DSS for winegrowers who want to optimize their production costs and get quality yield. This collaboration is included in the Bulgarian MIP and will continue to a) provide the DSS to grape- and wine-farmers, b) execute capacity building through training courses and c) teach students and researchers. It creates a network of cooperation between the agricultural sector, digital technology professionals, and scientists thus demonstrating in practice the Quadruple Helix concept. It is financially supported by an EU-funded project AgroDigiRise. The remote access and daily monitoring of thousands of acres of strategic crops such as grapes is entirely feasible. Farmers are provided with the opportunity to "test before invest," and receive a "tailor-made" expert advice on their individual functionality of technological solutions. The collaboration with experts who possess extensive experience in agronomy and a well-equipped university base are essential for collecting useful data and conducting innovative research in this field. The climate monitoring stations are being installed in the experimental grape yards of the AUP, located above the village of Brestnik, Plovdiv region. Parameters such as air and soil temperature and humidity, precipitation amount, wind speed, and direction will be monitored with aim to determine the microclimate in vineyards and analyze differences of temperature and humidity between the air and the vines themselves. Sensors placed in three locations within the grape arrows will detect these data to better understand the effects of these factors on the vine plants. Additionally, a comprehensive understanding of the most economically impactful grape diseases will be achieved by studying pathogen development within the vines throughout the year in relation to the phenophases of the corresponding grape varieties. The company software will process and analyze the collected data and visualizing it through a mobile application. The obtained information will assist farmers in increasing their yields, as well as improving the safety and quality of their harvest. Researchers from the AUP will conduct demonstrations to help interested farmers familiarize themselves with the functionality of the intelligent vineyard management software, which facilitates remote monitoring and smart grape cultivation. http://bevine.wine/en/viticultural-business-digitization-and-science/

PA2

Title: Ecorobotix - Sprayer of the future

Author: FBCD, Denmark

ARA Ecorobotix is the only ultra-high precision smart sprayer on the market. Smart spraying for ultra-localized treatments of your row crops, pastures, and lawns - Increase your efficiency while reducing the use of plant protection products. ARA is a high-precision sprayer developed by Ecorobotix that enables ultra-targeted application of herbicides, fungicides, insecticides, or fertilizers. ARA is the proven solution for complying with strict environmental regulations and increased farm profitability. Compared to conventional spraying methods, ARA allows you to reduce the use of plant protection products by up to 95% due to the ultra-precise, plant-by-plant spraying technique. ARA enables an increase in profitability of up to 30%, depending on the type of farm, while complying with legislation mandating the use of less and less plant protection products. ARA is recouped in three/four years with a medium-sized farm, and may also be eligible for subsidies in certain areas. ARA treats a large number of crops with all types of products and can be used throughout the year on different fields. ARA is the most precise field sprayer on the market that enables plant-by-plant spraying (targeting only individual weeds, not crops or soil). The benefits of ultra-high precision plant-by-plant spraying are: - Reduced phytotoxicity thanks to ultra-high precision spraying - increasing crop yields and improving biodiversity. - Close-to-the-ground nozzle action and protective covers minimize spray drift. The wide range of crop protection applications allows the use of herbicides, fungicides and insecticides for row crops, vegetable crops, as well as meadows and lawns. https://ag-precision.com/da/produkter/ecorobotix .

PA3

Title: A Methodology for Mapping and Analysis of Regional Bio-based Value Chains

Author: MTU, Ireland

The EU Bioeconomy 2018 strategy recognises the importance the bioeconomy can play in supporting regions across Europe to meet their sustainability objectives in a competitive manner, creating new industries and jobs in urban, rural and coastal regions. Regions have specific biomass, infrastructure and dynamics which need be considered when developing these bioeconomies. However. the majority of European regions are at the early stages of identifying, developing and implementing new bio-based value chains. MainstreamBIO have developed an approach to help regions to understand the current situation regarding bio-based value chains within their regions, by compiling and analysing data on biomass arisings, flows, value chains, stakeholders and innovations within the region. This approach has been piloted in diverse European region in Bulgaria, Denmark, Ireland, Netherlands, Poland, Spain and Sweden. The approach is partly based on a guided desk research within the regions, supplemented with interviews from key value chain actors within selected value chains for those regions. A data collection template has developed in order to ensure uniform collection of essential data, related to biomass arisings and flows, biomass price data, value chain actors and bio-based innovations. The collection of biomass value chain data is part-based on Attard et al. (2020), but adapted and expanded to include additional information such as relevant regional actors (across different categories) and innovations (e.g., development of demonstration projects for technologies, products and services). Upon collection of data from the regions, the data is assessed and converted into Biomass Arising Maps using ArcGIS Pro, to visualize biomass data for the regions and subregions. The relevant key value chain actors from these regions are also been mapped for each value chain, and coded based on the type of stakeholder they represent. Biomass flows are visualize using Sankey diagrams using PowerBI, in order to show the current end fate of selected biomass streams within the region. This, along with an assessment of the current price of biomass, provides an insight into the accessibility constraints associated with the biomass in these regions. Feedstock-specific value chain innovations are collected from across the regions, to provide a better understanding of the activities underway, and future innovation opportunities. The collection of the combined information provides regions with a baseline understanding of the regional bioeconomy with regarding to biomass, stakeholders, innovation etc., but also allows for an understanding of the possibilities for future development e.g., through identifying underutilised biomass, solution technologies, potential collaborators etc. The approach being deployed across diverse bioeconomy regions also demonstrates potential for cross-regional learnings, on common feedstock or technology areas etc.

PA4

Title: Anaerobic digestion

Author: WR, Netherlands

Anaerobic digestion is the fermentation process of organic matter in the absence of oxygen. Feedstocks are manure, crop residues or any other form of organic matter. The product of anaerobic digestion is biogas (CH4). Biogas needs to be upgraded to be able to use it in our gas network. The biogas can also directly be burned and used as heat or to produce electricity. Anaerobic digestion happens at different levels, from farm to regional levels, to even small scale with kitchen scraps. The technique is widely used and it's even more interesting in recent light, with rising gas and energy prices. The main advantage for farmers is the production of biogas. The digestate (the residual slurry after digestion) is still rich in nutrients and more uniform and can be directly spread onto the field. It can also be separated into a liquid and a solid fraction, so the nutrients can be applied to the field more precise. In case of digestion of manure before application on the field, this results in environmental profits like less greenhouse gas emissions (https://edepot.wur.nl/287471). A recent article in a farmers weekly reviews costs, benefits and realization of mono digestion of manure in the Netherlands (https://melkvee100plus.nl/financieel/vergisten-dagverse-mest-zeer-interessant/)

PA5

Title: INTER-NAW application for fertilization plan and nutrients accounting

Author: IUNG, Poland

The fertilization plan is the most important tool for managing NPK - essential nutrients in crop production. Developed in accordance with the principles of good agricultural practice, it takes into account the achievement of optimal plant yield and the reduction of the fertilization impact on the environment. In modern agriculture, advisory software is used to prepare a fertilization plan, supported by analyses of the content of NPK nutrients in the soil. The INTER-NAW application is designed for planning fertilization of field crops with NPKMg and soil liming. Fertilizer rates are determined by the field surface balance method. The information necessary for the calculation includes crop species, expected yield, forecrop species, information on the management of by-products (harvesting/ploughing), type of manure, organic, and nutrient recycling fertilizers used, their rates and nutrient content, current soil nutrient content, and pH. Based on that information, the application determines the nutrient needs of the plant and the amount of NPK available from sources other than mineral fertilizers at a site and then calculates how many nutrients should be used in fertilizers. The use of an appropriate correction factor allows you to adjust the rates of fertilizers to the abundance of nutrients in the soil. The application allows calculating the amount of manure produced on the farm along with the NPK content, based on information about the animal stock density and its keeping. The free INTER-NAW application is used in the Polish agricultural advisory system and made available by the National Chemical and Agricultural Station at www.schr.gov.pl.

PA6

Title: Alcarràs Bioproductors SAT - Farmers join forces and propel bioeconomy

Author: INNV, Spain

Alcarràs Bioproductors SAT is an inspirational case for those searching advice on organisational and coordination aspects. 15 years ago, 200 farmers from the Spanish town of Alcarràs decided to join forces and create a composting plant in which treat the solid waste of their bovine and porcine cattle. All farmers agreed to invest €1,5M and have backed up the process through all difficulties. Today, the plant produces 27kT of compost and is run mainly on solar electricity and rainwater. Given the success, farmers plan to expand the company by adding an anaerobic digester to produce biogas from liquid manure. They also aim at including a pilot plant in which surrounding agents could try out their bioeconomy initiatives. The implementation of this project cannot be understood without the social component. Previously existing cooperatives of bovine and porcine farmers were paramount to ensure trust, uniform opinions, and powerful acting will. As a united entity, farmers were more potent in asking for their demands. Treating all manures in the shared plant has put an end to previous individual costs (e.g.: transportation, renting a land for disposal, hiring a waste treatment

company,...) and worries (e.g.: where to place the manure, what if the waste treatment company closes/rises its charges,...). Practical recommendations to join forces: - Talk regularly to primary producers in your area. - Share your problems with each other: one can hold the answer to another's problem, or you can share a common problem. - Create an association to raise awareness about the field and the problems, and to have more impact when searching solutions. Work on trusting your partners. - Do not fear investing to solve a common problem. Think ahead.

PA7

Title: Apadrina un Olivo - Social innovation against rural depopulation

Author: INNV, Spain

Apadrina un Olivo (Adopt an Olive tree) is an initiative born in 2014 in a village in Aragon, with the aim of recovering abandoned centenary olive trees in an area with a very high rate of depopulation, contributing to the conservation of local biodiversity and the economic revival of the area.

The strong rural exodus experienced in Oliete, Teruel (ES) in the last 60 years caused the abandonment of more than 100,000 olive trees. The founders of Apadrina un Olivo saw an opportunity for economic development and conservation for the region, based on both the recovery of the olive grove and the attraction of visitors to the area.

The olive trees are sponsored for a fee of 60 euros, which gives you the right to name the olive tree, follow the recovery process through the farmer in charge, and visit the olive tree whenever you wish. In addition, whoever sponsors an olive tree receives 2 litres of Extra Virgin Olive Oil. This payment contributes both to the recovery of the olive grove and to the management of the initiative itself. The recovery of each sponsored olive tree is carried out following a series of steps: pruning and elimination of pruning waste, elimination of ground branches, soil tillage, spontaneous soil cover, soil fertilisation, foliar fertilisation with nettle slurry, ecological pest treatment and irrigation and maintenance.

The initiative has brought benefits in terms of employment generation, rural development and the environment. In the 10 years that the initiative has been running, more than 15,000 olive trees have been recovered, 16 jobs have been created, and visits to the village have increased significantly, reviving the local economy and even preventing the village school from closing! More info at: https://apadrinaunolivo.org/en

PA8

Hydrothermal liquefaction (HTL), for cost and energy efficient treatment of wet biobased residual streams, from forest industry or agriculture, to useful bio products.

Author: **PROC Sweden**

HTL (hydrothermal liquefaction) is a hydrothermal process that transforms wet biomass, with high pressure and temperature, to mainly liquid. Oil is the main product from HTL, but small amounts of gas and solid phase (carbon) are also formed. With HTL biomasses such as sawdust, bark and sludges are converted into a liquid oil that in many respects resembles fossil crude oil. The desired properties can be obtained by adjusting process parameters (catalyst, pressure, temperature and time). Biomass with high moisture content is not cost efficient to process by conventional technologies. HTL however can tolerate huge amounts of water thus it eliminates the costly dewatering step. Since a majority of residual materials from forests and agriculture are possible to use for HTL, a large raw material base is provided, both on regional, national and international level. Techno-economic analysis indicates economic potential for cases where bio sludge and fibre sludge from pulp mills is converted to bio-oil, and then used as energy source in the mills, replacing fossil fuels. Also, integrating pulp mills and HPP (High Pressure Processing) has shown possible synergies when fuel handling and disposal of process water can be coordinated. Production of fuel oil or propellant from these bio-based side streams enable new business models that broaden the economic efficiency of biorefineries. RISE Processum has a state-of-the-art HTL pilot facility from batch mode to continuous mode which has capacity to produce 1 kg oil/day. Work is underway to increase the capacity. So far bio-oil have been produced from mainly different types of forest industrial waste sludges, but the basic technique is the same for any biomass.

MAINSTREAM BIO
MAINSTREAMING SMALL-SCALE BIO-BASED SOLUTIONS ACROSS RURAL EUROPE

The project

MainstreamBIO is a Horizon Europe EU funded project, which sets out to get small-scale bio-based solutions into mainstream practice across rural Europe, providing a broader range of rural actors with the opportunity to engage in and speed up the development of the bioeconomy. Recognizing the paramount importance of bioeconomy for addressing key global environmental and societal challenges, MainstreamBIO develops regional Multi-actor Innovation Platforms in 7 EU countries (PL, DK, SE, BG, ES, IE & NL). The project aims to enhance cooperation among key rural players towards co-creating sustainable business model pathways in line with regional potentials and policy initiatives. MainstreamBIO supports 35 multiactor partnerships to overcome barriers and get bio-based innovations to market with hands-on innovation support, accelerating the development of over 70 marketable bio-based products and services. Furthermore, the project develops and employs a digital toolkit to better match bio-based technologies, social innovations and good nutrient recycling practices with available biomass and market trends as well as to enhance understanding of the bioeconomy with a suite of educational resources building on existing research results and tools. To achieve these targets, MainstreamBIO involves 10 partners across Europe, coming from various fields. Thus, all partners combine their knowledge and experience to promote the growth of bioeconomy in a sustainable and inclusive manner.

Coordinator: Q-**PLAN INTERNATIONAL ADVISORS PC (Q-PLAN**)

Partner		Short Name
Q-PLAN INTERNATIONAL	Q-PLAN INTERNATIONAL ADVISORS PC	Q-PLAN
MTU Ollscoil Teicneolaíochta na Mumhan Munster Technological University	MUNSTER TECHNOLOGICAL UNIVERSITY	MTU
WAGENINGEN UNIVERSITY & RESEARCH	STICHTING WAGENINGEN RESEARCH	WR
IUNG Institute of Soil Science and Plant Cultivation State Research Institute	INSTYTUT UPRAWY NAWOZENIA I GLEBOZNAWSTWA, PANSTWOWY INSTYTUT BADAWCZY	IUNG
RI. SE	RISE PROCESSUM AB	PROC
AGRICULTURAL UNIVERSITY PLOVDIV	AGRAREN UNIVERSITET - PLOVDIV	AUP
Food & Bio Cluster Denmark	FBCD AS	FBCD
innovarum	EURIZON SL	INNV
DRAXIS ENVIRONMENTAL TECHNOLOGIES	DRAXIS ENVIRONMENTAL SA	DRAXIS
WHITE	WHITE RESEARCH SPRL	WHITE