



**AGENT-BASED SUPPORT TOOL FOR THE
DEVELOPMENT OF AGRICULTURE POLICIES**

NEWSLETTER

Issue 3: March 2021

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AXIA INNOVATION



1. The AGRICORE suite

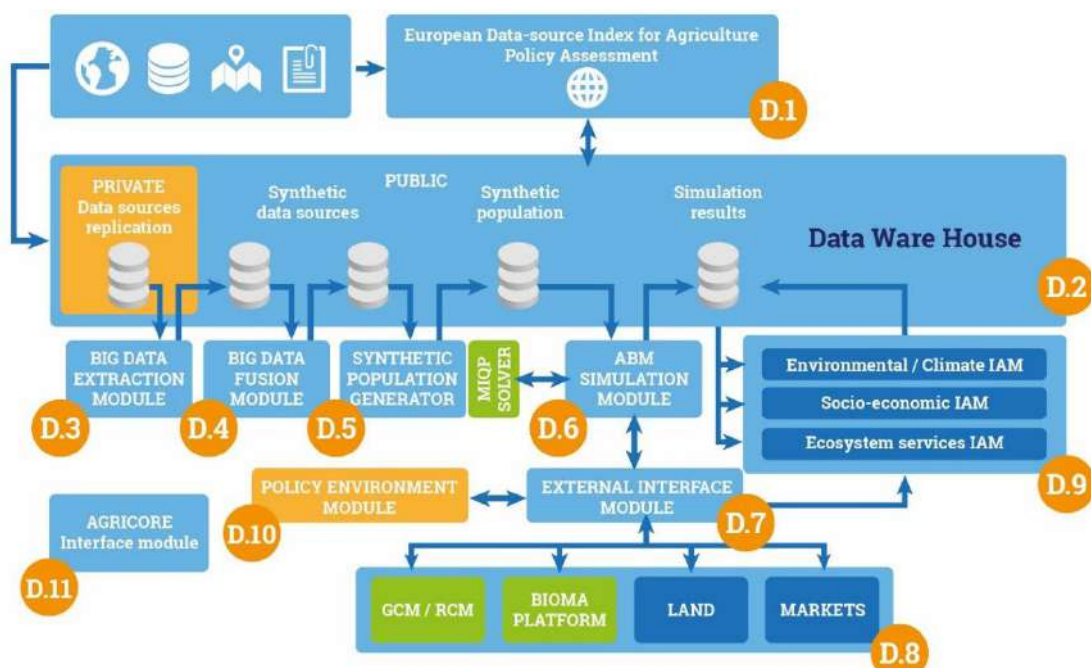


The AGRICORE project is developing a novel tool for improving the current capacity to model policies dealing with agriculture by taking advantage of the latest progress in modelling approaches and ICT. Specifically, the AGRICORE tool is being built as an agent-based approach where each farm is to be modelled as an autonomous decision-making entity that individually assesses its own context and makes decisions on the basis of its current situation and expectations. This modelling approach will allow simulating the interaction between farms and their context at various geographic scales – from

regional to global.

The AGRICORE suite will be a highly modular IT architecture in which modules can be exchanged, improved, and updated by other researchers and reused in other solutions. The architecture will be defined in a way to allow making use of the high computing and flexibility capabilities of cloud infrastructures both at public (Amazon Web Services, Azure, Google Cloud) and private (VMWare, OpenStack, HyperV) levels and always with a strong focus on data security (allowing the definition of private and public sections).

1. ARDIT
2. Data extraction module
3. Data fusion module
4. Generator of synthetic populations module
5. Agent-based simulation module
6. External interface module
7. Model interaction modules
8. Impact assessment modules (IAM)
9. Policy environment module
10. AGRICORE interface module





1. The AGRICORE suite



The partners will integrate all the modules composing the AGRICORE suite as a simulation environment ready for its use either for normative or positive purposes, and which will have both ex-ante (for policy design) and ex-post (for monitoring) analysis capacity. Such an integrated suite will allow its connection with biophysical models and a large set of databases including multiple data sources and geo-referenced datasets (interoperability).

The AGRICORE suite will support the process of monitoring and assessing the impact of policies at the farm, sector, and global levels. Some of

the impacts at the farm level will be related to farm structure, production costs and land balance while at sector and global levels will include environmental and socio-economic factors. In addition, impacts will be assessed for the whole rural area with an emphasis on the environment, development, and jobs.

The AGRICORE suite is to be linked with main tools already used at the European Commission, such as the CAPRI and the AGMEMOD. Moreover, it will allow us to improve the use of such tools by means of an integrated environment that will make the most of the synergies among them.





2. AGRICORE's Use Cases- UC2



The partners will apply the AGRICORE suite to the ex-post (covering the period 2014-2017) and ex-ante (respectively for 2018-2020) policy assessment of three use cases (UC1 - Andalucía, UC2 - Poland, and UC3 - Greece), which have been selected to test the tool at various geographic scales (the Andalusian case study corresponds to the regional level while

the other two aim at the national level) and for different policy instruments. In particular, the policy instrument in the Andalusian use case relates to environmental impact, while in the Polish use case it relates to the delivery of ecosystem services and, in the Greek one, it relates to the socio-economic aspects of the integration of agriculture in rural society.

In the previous issue of this newsletter, we had a look at the Andalusian use case, while here we provide you with insights regarding UC2, the use case of Poland.

USE CASE #2: Analysis of the impact achieved by the "M10.1 – Agri-environment-climate Commitments" measure defined in Poland's national RDP

UC2 will focus on the ex-ante (2019-2020) and ex-post (2014-2018) analysis of the impacts of a national level measurement (M10.1) (agri-environment-climate commitments) in the overall Polish agricultural system and specifically, on ecosystem services in the country.

REFERENCE POLICY / MEASUREMENT

Analysis focused in 5 sub-measures:

- Sustainable agriculture: Agri-environmental and climatic payments granted to arable land, aiming to promote a sustainable management system
- Protection of soils and waters: Payments for catch crops and to protective belts on slopes (<20%)
- Preservation of orchards even fruit trees: which also aims to preserve wild bird populations.
- Valuable habitats and generations of Natura 2000 species: maintaining, restoring or preventing deterioration of valuable natural habitats (inside Natura 2000 areas)
- Valuable habitats outside Natura 2000 areas: maintaining, restoring or preventing deterioration of valuable natural habits (outside Natura 2000 areas)

Main national priorities affected:
(P4) Ecosystems management (biodiversity, water and soils): 4A) Biodiversity restoration, preservation and enhancement; 4B) Water management; 4C) Soil management
(P5) Resource efficiency & climate: 5A) Carbon conservation and sequestration; 5D) GHG and ammonia emissions

REGION DESCRIPTION

Country	Poland
Level 1 Nuts	PL1-PL6
Municipalities	2478
Population	38.43 milio
Surface	312,696 km
Pop. density	123 hab/km
Agricultural hold.	1,410,700
Cultivated area	14,405,650 h
Livestock units	10.37 million LS
Average area / farm	10.65 ha
ANC area	62.5 %

Region classification: Less developed region

GVA (structure): 1.9% | 31.7% | 66.4%

GVA (agriculture): 20,200 million €

Employment(agri): 2,385,500 people

ANALYSIS SCENARIO

MAIN DATA SOURCES

Level 1/2 (NUTS)	Level 3 (NUTS)	Municipality	GEO referenced
FADN	Poland CSO	Municipal census	LUCAS
FSS	ARMA	LPIS	
	CAPRI	Participatory research	

BIOMA

- Soil water runoff/erosion/dist
- Pedotransfer functions
- MACSUR / MACSUR2 Models

HIRHAM HadRM3P A1B

IMPACT ASSESSMENT INDICATORS

Delivery of ecosystem services:

- Provisioning: Food provision; water provision; raw materials
- Regulating: Regulation of water
- Supporting: Biological control; production quality

Environmental and climate impacts of farming:

- Soil erosion and degradation; Pollution; Genetic erosion



2. AGRICORE's Use Cases- UC2



UC2 - Poland - Ecosystem services (UTP, IAPAS)

Poland covers six NUTS level 1 Regions (PL1-PL6) and has a population of 38.43 million of which 39% live in rural areas. All Poland's administrative regions are considered as less developed regions under article 2014/99/EU definition. In addition, the country is one of the member states eligible for funding from the Cohesion Fund under Article 4. Approximately 30% of the total surface of the country (312,696 km²) is covered by forest and 46% is used for agriculture from which 74.7% is arable land and 22.4% is permanent grassland and meadows. About 14,405,650 ha are used for agriculture, with an average area per farm of 10.65 ha (as there are 1,410,700 farms). The sector employs 2,385,500 people. A significant percentage (62.5%) of the agricultural land is classified as areas with natural constraints (ANC - Article 31 of Regulation (EU) 1303/2013). Moreover, 19.4% of the arable land faces various environmental challenges: 8.2% is particularly endangered by water and/or wind erosion, 3.6% experiences problems with low humus levels and 7.4% are defined as Nitrate Vulnerable Zones (areas that drain into waters polluted by nitrates). The selected instrument for this case study is "M10.1: Agri-environment-climate commitments", which is included in the national programme (2014PL06RDNP001) for the period 2014-2020 and rooted in Article

28 of the 1305/2013 EAFRD regulation. The measure contemplates payments to farmers and land-managers who, on a voluntary basis, commit their farming activities to one or more specific agri-environment-climate practice. The analysis will focus on the actions linked to the maintenance and improvement of **biodiversity** and to the preservation of natural resources (soil erosion and water quality).

Improvement potential

This AGRICORE use case will analyse the M10.1 measure influence on Poland, especially focusing on the rise of ecosystem services and on the environmental and climate impacts. The ex-post analysis will be done for the period 2014 to 2018 and the ex-ante impact analysis will be done for the period 2019-2020. To perform such analyses, the partners will use FADN, FSS, Eurostat, the Central Statistical Office of Poland, the agency for Restructuring and Modernisation of Agriculture (ARMA) and CAPRI databases. The available data will be complemented with information available at the national and regional level and by the execution of participatory research actions. Biophysical models including crop yield models based on precipitation and temperature data, rainfall distribution models and pedotransfer functions will be used for properly calculating the impact of the measure as well as for enhancing the accuracy of the agent-based modelling simulations.

3. Partner's Interviews





Uniwersytet Technologiczno-Przyrodniczy
im. Jana i Jędrzeja Śniadeckich w Bydgoszczy




INSTYTUT
AGROFIZYKI
P A N


1. "What were your main reasons for getting involved in the project? What excites you the most about this project?"

 **UTP:** Our biggest motivation for participating in this project was the possibility of transferring our experience in modelling and simulation of decision scenarios and helping stakeholders to take action. Improving the primary sector is very important in the case of Poland, from the point of view of the entire agri-food economy being fundamental for the domestic economy. Simultaneously, we would like to contribute to the sustainable development of rural areas through developing eco-service provision, influenced by a healthy natural environment and help to stabilize climate not only in Poland but across the EU. The most exciting part of the project will be to shape future agricultural policies with the aid of the tools developed in the project, to ensure better conditions of development for farms and ecosystems.

 **IAPAS:** The main reason for joining the initiative was the desire to test oneself in the challenges of the Horizon 2020 program and the willingness to contribute to an interesting subject related to the creation of analytical tools and methods supporting agriculture. A particularly interesting aspect of this initiative was the possibility of developing methods of analysing farmers' behaviour on a large spatial scale. The most exciting thing about this project for me is the interaction between different groups and the way we come to optimal solutions together.

2. "What could be the benefits/take-home messages for all stakeholders involved in such an initiative?"

 **UTP:** A crucial message is that science and technology must be integrated within the agroforestry sector, not only through farming business aspects but also through their key external factors. Such factors when designing public policies include the environmental-climate effects which are important for the domestic economy as a whole, but also, especially important for future perspectives of rural areas' sustainable development. This sustainable potential is determined by shaping conditions that are friendly for eco-services development. To achieve such milestones, the existence of appropriate methodology, modelling tools, and data is required. Hence, to maximize the AGRICORE project's impact, post-project cooperation not only between universities but also many stakeholders is required in order to enable multilateral benefits. These stakeholders from consumers, eco-services consumers, farmers, public administration, governments, to other types of agricultural stakeholders, food processors and retailers.

 **IAPAS:** Taking part in such an initiative brings benefits related to gaining experience in working with an expert, multinational group of researchers. It gives an opportunity for new scientific contacts, expanding interests, learning about new methods and more. It is a very valuable experience for preparing for future independent applying for EU projects.



3. Partners




Uniwersytet Technologiczno-Przyrodniczy
im. Jana i Jędrzeja Śniadeckich w Bydgoszczy




INSTYTUT
AGROFIZYKI
P A N

3. “What aspects of the project are you mostly looking forward to seeing come to fruition?”

 **UTP:** UTP is really looking forward to the implementation of the reform of the CAP, in order to work with the extended registration system – Farm Accountancy Data Network to have much more detailed environmental data compared to previous versions. This would enable improved analyses of the two-way linkage between the environment with agriculture and ecosystems (soil, water, air, biodiversity). We think that AGRICORE project

can contribute to detecting and defining such data which should be included in the extended FADN.

 **IAPAS:** All the aspects of the AGRICORE suite elaboration are very interesting, and I am looking forward to seeing their final shape. However, what makes me most anxious to see are two modules (environmental/ climate impacts module and ecosystems services KPIs module) which are planned to be completed at the final stage of the project. I am very happy to be part of the team preparing these modules.





4. IPR Exploitation Workshops

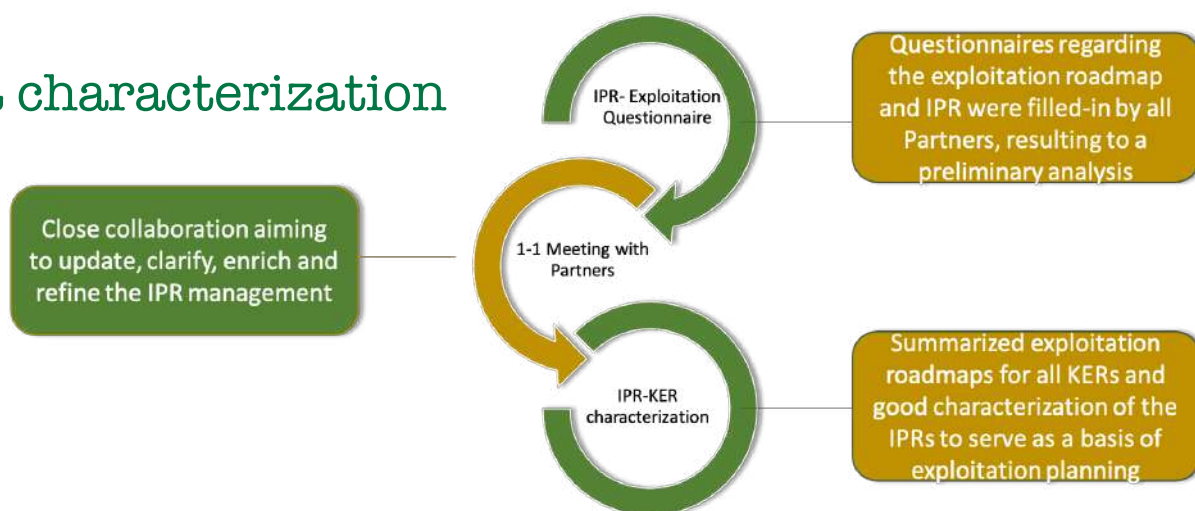


WHY?

As part of the “IPR Management” task, AXIA Innovation organized 3 IPR exploitation workshops/seminars for the whole consortium. These seminars served as a basis for the coordination and implementation of the protection of the intellectual property generated by each partner within AGRICORE and are part of the individual exploitation strategy of the project’s key exploitable results (KERs). The idea behind the workshops was to identify and clarify in an early stage of the project the roadmap towards the protection and commercial or scientific exploitation of the key exploitable results of each partner. Mainly, these workshops were the key points of the IPR management of AGRICORE. The focus has been on presenting to the partners what is being done, enabling well-

rounded discussions and decision making for AGRICORE’s exploitation and setting up the foundations for clear causal linkages between technical development of the AGRICORE Suite and its exploitation strategy. These workshops aimed to integrate into the management process of intellectual property rights by connecting all other IPR-related activities carried out by AXIA Innovation, such as surveys and cataloging, one-on-one interviews and Key Exploitable Results’ analyses. This has been essential in order to coordinate the entire exploitation and IPR management effort in this critical initial phase of the AGRICORE project, focusing on the individual exploitation strategy of the project and moving forward to build on it and optimize its joint exploitation plan.

IPR-KER characterization process:





4. IPR Exploitation Workshops



HOW?

The specific targets and goals of these workshops were:

1. Workshop 1 (M06): Determination of background and foreground IP based on results from IPR questionnaires, the first identification of exploitable results from the identified foreground.

2. Workshop 2 (M12): Update on exploitable results, the definition of individual exploitation paths and protection means. Identification of contributions and exploitation claims on the exploitable results.

3. Workshop 3 (M18): First thoughts on Roadmaps towards exploitation. Set up of a roadmap for exploitation and market.

The 1st IPR seminar was held in January 2020 in the form of a webinar hosted by the European IPR Helpdesk in order to build a common base of IPR understanding within the AGRICORE consortium. The choice to have the first workshop covered by a professional organization was on purpose since the intention was to have this first contact/touch of the consortium with this sensitive issue of IP to be implemented by the EC experts.

The second IPR workshop/seminar was scheduled for October 2020 and was held by

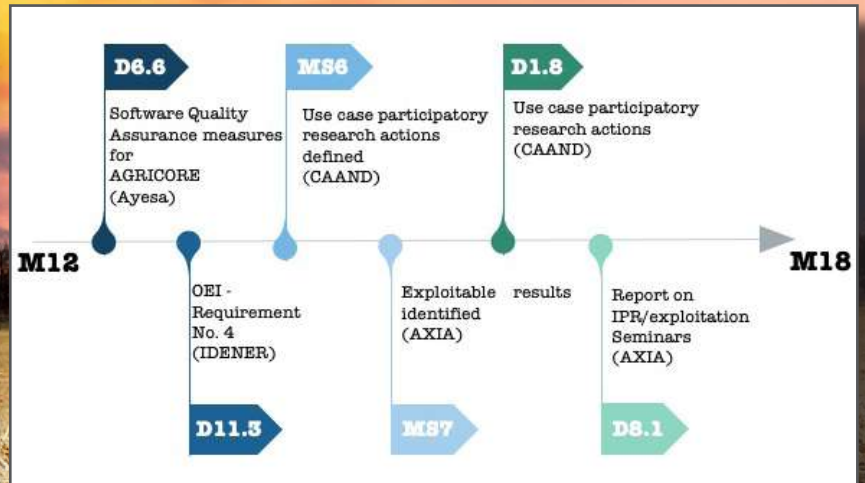
AXIA Innovation for the whole AGRICORE consortium. The target of this workshop was to go one step forward and dive into more details regarding IPR and the specific connection to the individual exploitation goals of AGRICORE's partners. Additionally, special attention was given to an analysis of the particularities of AGRICORE's open-source exploitation and how it is linked with the tool's development.

The 3rd IPR workshop was held in February 2021 by AXIA Innovation in collaboration with Exelisis. This workshop was the last IPR workshop foreseen and thereby completed the series of seminars & workshops dedicated to the proper handling of the individual intellectual property generated by the partners. During the workshop, the systematic exploitation audit for characterizing and analysing AGRICORE's individual exploitable results was presented. Clear connections were identified between the results of the project, its background and how this will affect its exploitation. This analysis will then be used as an input for a number of other tasks of the project's work plan.

5. Progress



The last six months were a very fruitful period for the AGRICORE project! Four deliverables have been submitted and two relevant milestones have been fulfilled. In M15, Ayesa submitted D6.6 Software quality assurance for AGRICORE, proposing a development guide to ensure that the integration of all developments of the foreseen modules is done straightforwardly. This will enable avoiding last-minute integration problems that may affect the project schedule, as well as unify the mechanisms and solutions offered. In M18, CAAND compiled the D1.8 Participatory research actions where the participatory research actions developed during the first 18 months of the AGRICORE project are described, and the design and planning of participatory research activities to be developed during the coming months are presented. AXIA successfully completed the series of IPR exploitation workshops foreseen to be held in the first 18M of the project and analysed the work and main outputs in the D8.1 Report on IPR exploitation seminars. Finally, IDENER worked on the D11.3 OEI- Requirement No.4 which targets to minimise risks to the research participants and addresses the potential issues of associated issues of algorithmic transparency and accountability.



Deliverable No.	Deliverable Title	WP No.	Lead beneficiary	Type	Dissemination level	Due Date in months
D6.6	Software Quality Assurance measures for AGRICORE	WP6	Ayesa Advanced Technologies	Report	Public	M15
D1.8	Use case participatory research actions	WP1	CAAND	Report	Public	M18
D8.1	Report on IPR/exploitation Seminars	WP8	AXIA	Report	Public	M18
D11.3	OEI - Requirement No. 4	WP11	IDENER	Ethics	Confidential	M18

Milestone No.	Milestone title	Lead beneficiary	Due date (in months)	Means of verification
MS6	Use case participatory research actions defined	CAAND	M18	D1.8 published
MS7	Exploitable results identified	AXIA	M18	D8.1 Published



6. Upcoming Events



COVID-19 remark

We are taking Covid19 very seriously. The consortium is made up of partners from all around Europe, all of them coping with the current pandemic in the best way possible, considering the health and safety of their people as their number one priority. But this did not stop us from working on our project! We identified a list of upcoming events which are mainly organized remotely and are interesting for our project or nice dissemination opportunities!

Title	Date	Location	Link (Click on the link)
Rural Vision Week: Imagining the future of Europe's rural areas Online	22-26/03/2021	Online	https://enrd.ec.europa.eu
EIP-AGRI workshop 'Towards carbon neutral agriculture'	24-25/03/2021	Online	https://ec.europa.eu
EIP-AGRI seminar: Healthy soils for Europe: sustainable management through knowledge and practice	13-14/04/2021	Online	https://ec.europa.eu
Global Symposium on Soil Biodiversity	19-22/04/2021	Online	http://www.fao.org
EU Green Week 2021	31/05/- 04/06/2021	Online	https://www.eugreenweek.eu
European Research and Innovation days	23-24/06/2021	Online	https://research-innovation-days.ec.europa.eu
EAAE Congress	20-23/07/2021	Online	http://www.eaae2021.org



7. AGRIMODELS Cluster- Research projects join forces to enhance agricultural EU policies



European research projects team up for a common goal - to develop novel modelling capabilities in the agricultural sector and contribute to a new architecture of agricultural policies in the European Union. AGRICORE, BESTMAP and MIND STEP build the AGRIMODELS Cluster, which aims to develop synergies among the projects to improve agricultural policy-making from different, yet complementary, perspectives.

Food and water security, carbon storage and biodiversity are threatened by processes such as land-use intensification and changing climate. European, national and regional policy makers must rethink and redesign agricultural policies to enhance the sustainability of agricultural landscapes while ensuring farmers' livelihoods. In 2017, the European Commission opened

a call for projects aiming to improve modelling capabilities for agriculture, taking advantage of progress in the Information and Communications Technology (ICT) field, which would ultimately support evidence-based policy-making in the sector. As a response to this call, three projects proposed innovative approaches to increase modelling capabilities. Now, these projects act together forming the AGRIMODELS Cluster, a union to maximize potential synergies between the three consortia.

AGRICORE, BESTMAP and MIND STEP will develop modelling at various geographic scales - from regional to pan-European. They aim to build a highly modular and customisable toolset, which will allow flexible use and further improvements as needs arise.





7. AGRIMODELS Cluster- Research projects join forces to enhance agricultural EU policies



THE PROJECTS

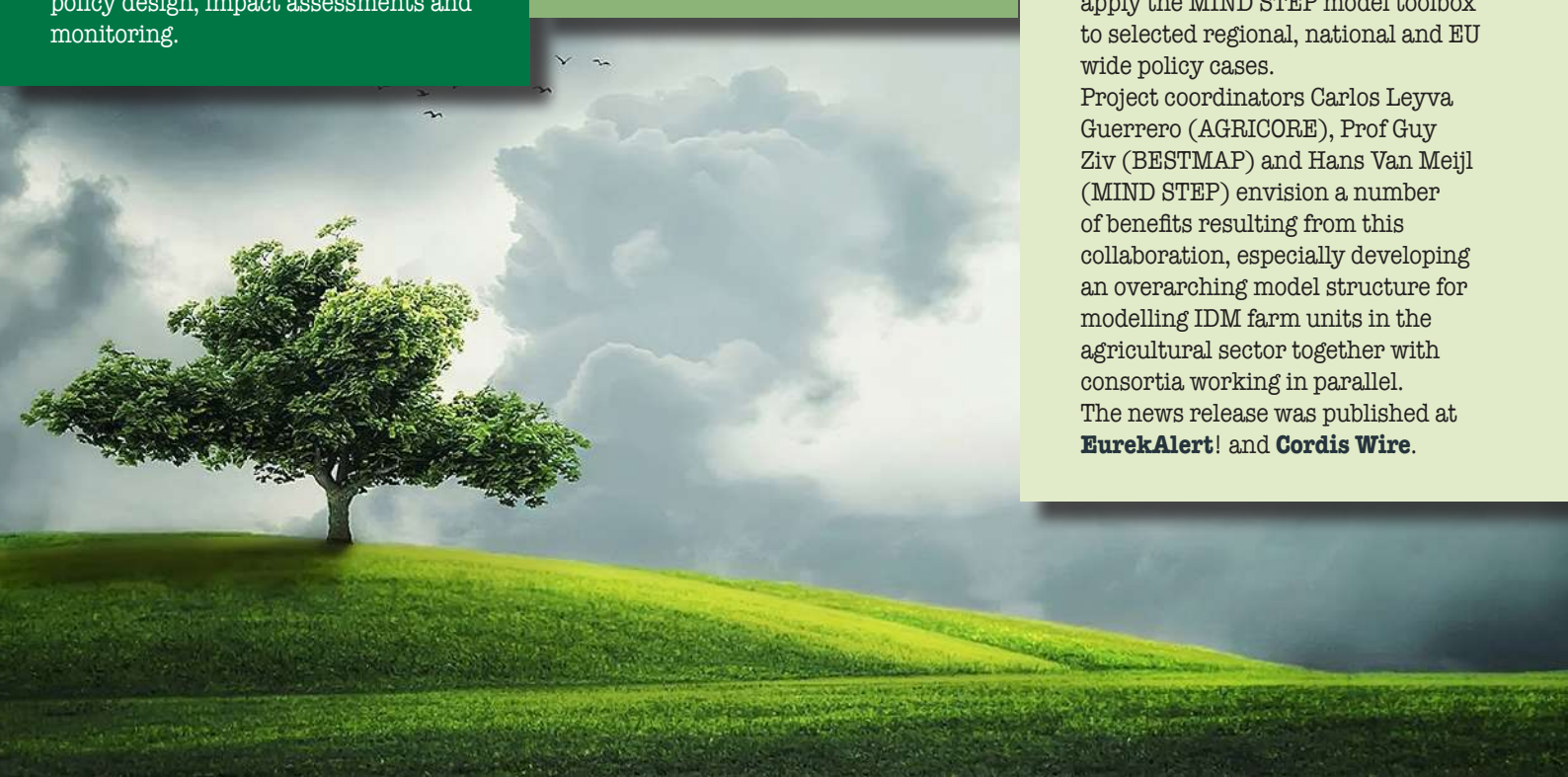


The **AGRICORE (Agent-based support tool for the development of agriculture policies)** project will develop a new generation Agent-Based Model (ABM) tool taking advantage of the latest progresses in modelling and ICT. The goal is to improve the current capacity of modelling policies, which deal with agriculture. AGRICORE aims to perform the related socio-economic and environmental assessments at various geographic scales - from regional to global. The AGRICORE tool will be released as open-source so institutions can transparently update and improve the tool as needs arise, with the overall aim to improve policy design, impact assessments and monitoring.

BESTMAP (Behavioural, Ecological and Socio-economic Tools for Modelling Agricultural Policy) will develop a new modelling framework using insights from behavioural theory, linking existing economic modelling with individual-farm Agent-Based Models. This innovative modelling framework will transform future EU rural policies' design and monitoring, promoting a sustainable future for the EU agricultural sector. The project will demonstrate the new approach in five case studies regions which hold diverse agricultural, socio-economic and political backgrounds.

MIND STEP (Modelling Individual Decisions to Support the European Policies Related to Agriculture) develops Individual Decision Making (IDM) models, including agent-based models, focusing on different topics in an integrated manner in different regional case studies. The IDM models will be estimated and calibrated using agricultural statistics and big datasets, drawing on established econometric and evolving machine-learning techniques and using both traditional models of optimising behaviour and theories from behavioural economics. MIND STEP closely cooperates with a range of stakeholders to co-create and apply the MIND STEP model toolbox to selected regional, national and EU wide policy cases.

Project coordinators Carlos Leyva Guerrero (AGRICORE), Prof Guy Ziv (BESTMAP) and Hans Van Meijl (MIND STEP) envision a number of benefits resulting from this collaboration, especially developing an overarching model structure for modelling IDM farm units in the agricultural sector together with consortia working in parallel. The news release was published at **EurekAlert!** and **Cordis Wire**.



8. Who we are



The AGRICORE project builds on the strong knowhow and expertise of its partners in the addressed scientific and industrial areas. The consortium is comprised of 11 European partners from 6 countries. AGRICORE is a well-balanced project between industry and academia ensuring and speeding up the successful implementation of all the actions towards its fruitful results.



www.agricore-project.eu

4 Universities

(AUFH, UNIPR, AKD, UTP)

4 SMEs

(AXIA, EXE, STAM, IDE)

1 Research and Technology Organisation

(IAPAS)

1 Large Company

(AYESA)

1 regional farmer association

(CAAND)



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