D8.2 Roadmap for the exploitation of project results

agricore

Deliverable Number	D8.2
Lead Beneficiary	AXIA
Authors	AXIA, IDE, AAT, AKD, AUTH, AXIA, CAAND, IAPAS, PBS, STAM, UNIPR
Work package	WP8
Delivery Date	M45
Dissemination Level	Public

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The Agricore project has received funding from the European Union's Horizon 2020 research and innovation programme under the Grant Agreement No. 816078

Document Information

Project title	Agent-based support tool for the development of agriculture policies
Project acronym	AGRICORE
Project call	H2020-RUR-04-2018-2019
Grant number	816078
Project duration	1.09.2019-31.8.2023 (48 months)

Version History

Version	Description	Organisation	Date
0.1	Deliverable structure and introduction of previously gathered input	EXE/AXIA	18-dic-2022
0.2	Communication with the consortium to gather updates and key input	EXE/AXIA	19-dic-2022
1.0	First draft with gathered input from new updates	EXE/AXIA	31-ene-2023
1.1	First draft of the deliverable with the available input	EXE/AXIA	28-abr-2023
1.2	Second draft of the deliverable with all input and sharing with the consortium for review	EXE/AXIA	03-jul-2023
2.0	Final version - Submission	IDE/EXE/AXIA	20-jul-2023

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Executive Summary

The AGRICORE project, funded under H2020, aims to develop an agent-based support tool for the development of agriculture policies. The project leverages advancements in modelling approaches and ICT to enhance the capacity to model and simulate the impact of agricultural policies. The core component of the project is the AGRICORE tool, a highly modular and customisable suite that simulates the decision-making processes of individual farms within their unique contexts.

The Exploitation Roadmap deliverable, a key output of Work Package 8, focuses on the post-project exploitation planning for the Key Exploitable Results (KERs) generated within the AGRICORE project. These KERs represent significant project outcomes and encompass a range of results from participating organisations, including universities, research institutions, and companies. The Exploitation Roadmap provides a comprehensive framework for characterising each KER and outlines the intended actions and exploitation plans for maximising their impact.

The roadmap is complemented by the Plan for Exploitation and Dissemination of Results (PEDR), which offers a broader view of the project's exploitation and dissemination activities. The Exploitation Roadmap specifically delves into the KERs, providing detailed insights into the exploitation intentions of each partner organisation. It highlights the diverse opportunities for further exploitation, collaboration, and application of the KERs in different fields and projects.

The Exploitation Roadmap and PEDR collectively support the European Commission's objectives by contributing to evidence-based policy development. The AGRICORE project aims to assist policymakers at various levels, including the European Commission's relevant directorate and agencies, in designing and implementing effective agricultural policies and measures. The open-source nature of the AGRICORE tool further promotes collaboration and innovation within the open-source community, fostering the exchange of knowledge and driving advancements in sustainable agriculture.

Overall, the Exploitation Roadmap serves as a strategic guide for maximising the post-project impact of the AGRICORE project's KERs. It outlines the intentions and envisaged exploitation routes of preference for each KER, providing valuable insights for policymakers, researchers, and organisations seeking to leverage the project outcomes for further innovation, decision-making, and sustainable agricultural practices.

Abbreviations

Abbreviations	Full Name
ABM	Agent-based model
DoA	Description of Action
EU	European Union
FADN	Farm accountancy data network
FAIR	Findable, Accessible, Interoperable and Re-usable data
ICT	Information and Communication Technology
IP	Intellectual Property
IPR	Intellectual Property Rights
KER	Key Exploitable Result
KPIs	Key Performance Indicators
PEDR	Plan for the Exploitation and Dissemination of Results
PMP	Positive mathematical programming
RTO	Research and Technology Organization
TRL	Technology Readiness Level

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1 Introduction

This deliverable represents one of the main outputs results of the work within *Task 8.1: IPR Management* and *Task 8.2: Roadmap towards exploitation of project results* of AGRICORE as part of *WP8 Exploitation, clustering, and open sourcing*. The Exploitation Roadmap, a result of the collaborative efforts between AXIA and EXELISIS within WP8 of the AGRICORE project, serves as a comprehensive planning framework to strategically exploit the project's Key Exploitable Results (KERs). Throughout the project's duration, AXIA and EXELISIS have engaged with the consortium, actively seeking input and insights through various channels, such as exploitation and intellectual property rights (IPR) questionnaires, one-on-one interviews, and collaborative feedback sessions.

The Exploitation Roadmap, complementing the Plan for Exploitation and Dissemination of Results (PEDR), aims to provide a comprehensive and detailed framework for maximising the impact and potential of AGRICORE's KERs. Within the Exploitation Roadmap, each KER is meticulously characterised by the partner responsible, capturing significant information about their post-project exploitation intentions. By analysing the partner's strategic objectives, proposed actions, and envisaged outcomes, the roadmap outlines a clear path for translating the project's results into real-world applications and societal benefits.

The deliverable presents a series of tables that meticulously outline the KERs, providing a holistic view of the project's valuable outcomes. These tables showcase the contributions of each partner involved in the AGRICORE project, highlighting their unique expertise and role in the exploitation of KERs. The information presented includes details about the partner's intended actions, ranging from intellectual property protection to commercialisation strategies, licensing opportunities, open-access initiatives, and knowledge transfer plans. Moreover, the Exploitation Roadmap encapsulates the partner's aspirations for long-term sustainability and scalability of the AGRICORE tool, emphasising transparency and the potential for ongoing updates and improvements.

The Exploitation Roadmap serves as a living document, offering flexibility and adaptability to accommodate emerging opportunities and evolving market needs. It provides a complete framework of envisaged actions to be performed and/or pursued, empowering the consortium to capitalise on the project's KERs and drive positive societal and economic change in the agricultural sector. The roadmap not only outlines specific exploitation intentions but also provides guidance on potential collaboration opportunities, fostering partnerships and knowledge exchange beyond the project's scope.

Finally, please note that this deliverable aims to present the exploitation roadmap for the individual KERs as they have been described within the PEDR and following the distinction made therein between those individual results and the joint AGRICORE tool exploitation. The latter will be further discussed within the final PEDR deliverable, alongside the rest of its exploitation planning.

2 Exploitation routes identified

This deliverable aims to provide a comprehensive and insightful overview of the exploitation routes and key exploitation steps, also known as the exploitation roadmap, for each KER owned by the AGRICORE project partners. By delving into the valuable input gathered from our partners through questionnaires, one-on-one meetings, consortium gatherings, and regular updates, we aim to present their current intentions for leveraging the outcomes of the AGRICORE project.

In this chapter, you will find a detailed profile for each KER, offering a comprehensive understanding of its characteristics. These profiles encompass a description of the KER, relevant keywords, owner information, associated goals, and the specific type of KER. By exploring these profiles, you will gain valuable insights into the diverse range of KERs developed within the AGRICORE project and their potential applications.

Furthermore, we will provide a dedicated description of the particular target audience for each KER, shedding light on the intended beneficiaries and stakeholders who can benefit from its exploitation. By identifying these target audiences, we aim to facilitate effective dissemination and utilisation of the KERs by our consortium in the post-project exploitation phase of AGRICORE, ensuring their impact reaches the relevant domains, including policymakers, researchers, public authorities, agricultural associations, investors in the agricultural industry market, food-related organisations, and those involved in climate or biodiversity policies/policymaking.

It is important to note that the exploitation route presented does not entail legal obligations or commitments from our partners. Rather, it represents their current intentions and envisaged pathways for leveraging the results of the AGRICORE project. It is an opportunity for our partners to showcase their planned exploitation steps and highlight the potential value and impact of their respective KERs. The consortium is encouraged to explore the diverse possibilities arising from these exploitation routes without limiting their perception of the project results' exploitation potential to that of the AGRICORE tool only. Please, keep in mind that the overall exploitation planning for the AGRICORE tool as a whole will be addressed in the final Plan for Exploitation and Dissemination of Results (PEDR) deliverable (D9.8), and the activities related to open sourcing will be concluded and reported in deliverable D8.4, thus differentiating the focus of this deliverable to that of presenting the exploitation roadmap only for the individual KERs owned by the individual AGRICORE partners.

By engaging with the insights presented in this chapter, the consortium aims to actively contribute to the realisation of the AGRICORE project's vision. The primary aim is to capitalise on the resulting knowledge of AGRICORE to foster innovation, collaboration, and advancement in agriculture policies development and beyond. Through the utilisation of AGRICORE's outcomes and the exploration of its exploitation routes, the consortium aims to provide a tool that can drive transformative impact in policymaking, ultimately improving the agricultural sector and related fields.

2.1 Individual Exploitation

AXIA and EXELISIS have been working to define and characterise the dual exploitation planning of AGRICORE as it has been described in the first (D9.1) and midterm (D9.7) PEDR deliverables. The exploitation of the AGRICORE tool as a whole has been the main focus of the PEDR itself (the final PEDR D9.8 will present the complete picture of the tool's exploitation plan), while the exploitation planning for individual KERs arising from the involvement of each partner in the project and their particular contributions have been analysed more in detail in D8.1.

Here, the exploitation roadmap, as it has been evolved and intended by the individual partners, is presented, summing up the routes and key steps that are currently within the partners' plans

for the post-project exploitation of AGRICORE's results. The exploitation intentions and planning for the individual KERs have been maturing and evolving as the project progresses. A typical example can be viewed in the case of IP protection, where the relation between KERs and the AGRICORE tool (dependencies) has already been identified; therefore, the final licensing choices that will be presented within D8.4 will be necessary for individual partners willing to pursue IP protection of any future/derivative work. The information presented here for each KER consists of a presentation of each partner's background, IP dependencies and general exploitation goal considerations while also providing an update on what has been presented in D8.1, including any changes in the exploitation routes, a description of the targeted audience and a description of the envisaged key exploitation steps to be implemented by the partner exploiting their KERs.

Given that the AGRICORE project is not aiming to develop particular processes, products and directly commercially exploitable technologies but rather develop methodologies and tools that will be utilised for policy design/development support, its exploitation planning presents some degree of particularity. AGRICORE has pledged to publish all its results as open access, thus including the AGRICORE tool and all its modules, related models, data, etc. Additionally, the goals for the development of all these results by the consortium are far from benefiting commercially for profit, but rather to facilitate policy development support and help maximise positive impact in the agricultural development. Therefore, the key exploitation steps the consortium has envisaged in order to follow the exploitation route (of each KER) are mostly related to involvement in further research, utilisation of the knowledge gained in AGRICORE to pursue related, similar or similarly-oriented research, and building on the methods and tools developed here to achieve more advancements in similar applications, without of course the opportunities of internal exploitation, especially for industrial partners.

2.1.1 IDENER

Table 1. IDENER's Background.

Background	Dependencies	Exploitation intentions/ Derivative works
• Agent-based modelling and mathematical optimisation expertise. Experience in the development of agent-based models and optimisation systems. • IDENER is the owner of the background, and therefore, there are no limitations in the use of the background, neither for the implementation or exploitation phase of the project.	Dependencies of IDENER's IP have been identified and are to be taken into account in IP protection within AGRICORE suite licensing and derivative works.	Intentions for the following KER(s) to be appealing for future exploitation and derivative works to: • Large businesses - Yes • Open-source community - Maybe

KER1 – Agent-based modelling and agent-based simulation engines

Table 2. KER1 – Description.

KER Description	This key exploitable result is a program or set of programs that allow the creation, modification, and operation of virtual representations (agents) of real elements, also enabling the autonomous establishment of interactions between them. Within AGRICORE, the target is to simulate the operations and interactions of farms as autonomous decision-making entities (agents) who make decisions based on their current situation and expectations. During the course of the project, KER1 evolved to integrate an additional module defined as an agent-based model of a short period based on positive mathematical programming or an "Agronomic model" owned by UNIPR (KER1-B). This KER started at TRL 4 and aimed to reach TRL 6 by the end of the project.

Type of KER	ICT Software Digital solution
Related EU Mission	Not applicable
Needs	Knowledge sharing
Keywords	• Agent-modelling • Agent-based simulation, • Virtual representations, • Microscopic modelling.
Ownership	100% IDENER

Target audience (main): Research and Technology Organisations

The main target audience is composed of research and technology organisations due to the scientific knowledge of modelling that is necessary to understand, modify and improve the ABM. However, in a practical way, other actors can interact with this development, such as universities, policymakers and other experts with a minimal computational background whose field is related to the ABM.

Exploitation routes:

IDENER decided to follow a semi-commercial market-oriented exploitation route, commercialising this KER by a) providing services to potential customers and b) exploiting it internally in terms of integrating the agent-based simulation engine in other suites developed by IDENER or third parties for other types of applications that need to detect emergent behaviours resulting from direct interactions between real persons, companies, or entities.

- Commercial exploitation: The ABM module might be exploited to simulate similar populations as long as they behave as profit-driven agents that seek the maximum revenue as a result of their actions. This will strongly depend on the availability of data to generate the synthetic population and initialise the module.
- Scientific exploitation: The generation of new knowledge in the form of synthetic population evolution and datasets will arise when the ABM module is used in future use cases and projects. In addition, improved ABM modules and ABM modules for other purposes that will be derived from the one developed in the AGRICORE project can be considered as new knowledge.

IP protection

IDENER stated that they are interested in an open-source license as a means for IP protection of KER1. Specifically, the exploration of different types of open-source licenses (more permissive/ less permissive) for different parts of the code is desired in order to cover properly the necessity of compatibility with the AGRICORE suite as well as to serve the individual preferences of the company regarding the commercialisation of KER1.

All outputs obtained with the development of the AGRICORE Tool will be open access due to the nature of the project itself. In the case of the ABM module, these outputs might mainly be data generated from its use in future simulations and new/improved versions of the module developed a posteriori in the project's framework.

Correlation to the AGRICORE suite: This KER will constitute a dependency of the AGRICORE suite.

KER2 – Synthetic population generation from probability distributions

Table 3. KER2 – Description.

KER Description	This key exploitable result is a set of algorithms and/or programs allowing the construction of an anonymised population of individuals according to a set of given probability density functions of the corresponding real individuals. This KER started at TRL 3 and aimed to reach TRL 5 by the end of the project.
Type of KER	ICT Software Digital solution
Related EU Mission	Not applicable
Needs	Knowledge sharing
Keywords	• Synthetic Populations • Anonymisation, • Privacy-preserving agent-based modelling
Ownership	100% IDENER

Target audience (main): Research and Technology Organisations

The main target audience is composed of research and technology organisations due to the scientific knowledge of modelling that is necessary to understand, modify and improve the SPG module. However, in a practical way, other actors can interact with this development, such as universities, policymakers and other experts with a minimal computational background to generate synthetic populations.

Exploitation routes:

For KER2, IDENER targets scientific exploitation through subsequent research activities and through further involvement in research. In detail, the creation of synthetic populations for the subsequent construction of agents representing each of the members of the synthetic population may be of interest in other cases of public policy simulation or for the simulation of advertising/marketing activities, or for simulating labour relations in business environments while maintaining the anonymity of employees, for example.

- Scientific exploitation: The generation of new knowledge in the form of new synthetic populations will arise when the SPG module is used in future use cases and projects. In addition, improved SPG modules and SPG modules for other purposes that will be derived from the one developed in the AGRICORE project can be considered as new knowledge.
- Commercial exploitation: The SPG module might be exploited to generate similar populations as long as enough and proper data are available.

IP protection

Since the exploitation route desired for KER2 is exclusively scientific and research-oriented towards the further development of the KER, IDENER does not claim any IP protection at this stage.

All outputs obtained with the development of the AGRICORE Tool will be open access due to the nature of the project itself. In the case of the SPG module, these outputs might mainly be new synthetic populations generated from its use in future applications, and new/improved versions of the module developed a posteriori in the project's framework.

Correlation to the AGRICORE suite: This KER will constitute a dependency of the AGRICORE suite.

Key exploitation steps for KER1 and KER2:

Even though IDENER is a for-profit organisation (SME), its exploitation intentions for this KER are not within the traditionally preferred market-oriented scope of capitalising on a result to generate direct profit for the IP owner. IDENER aims to exploit the generated code, model, and the knowledge they have obtained from its development process by using it as a basis for building upon other similar and/or relevant applications. The company is highly invested in its research and innovation projects and particularly very active in EU-funded research, already directly exploiting this result in the BIOVALUE project while also intending to explore more opportunities for capitalising on the innovation potential of KER1 in more future projects, both EU-funded and not.

The expected time to market of KERs 1 and 2 was initially estimated based on the progress of the work implemented in the relevant work packages of the project. Accordingly, IDENER estimated a) for the agent-based modelling 12 months after the completion time of the relevant WP (Month31) and b) for the agent-based simulation module, as well as for the synthetic population generator 12 months after the completion time of the relevant WP (Month 39 for both KER1 and KER2). Note that particularly for KER2, "expected time to market" refers here to the time this result can be further exploited scientifically.

The BIOVALUE project started on October 2021, directly building on AGRICORE knowledge. IDENER's planning is exploring the possibility of pursuing the establishment of 1-2 research projects consisting of AGRICORE and/or BIOVALUE derivative works by December 2025. The advances in KERs 1 and 2 in both projects will provide an estimation of the potential use of ABM and SPG modules, as well as their weaknesses and modifications/needs for further applications. In addition, in the short term (1-2 years after the end of the project), it is planned to include one or both technologies in projects in the field of agriculture or similar. The purpose of this is, on the one hand, to focus on the improvement of the modules themselves (i.e. new algorithms and novel approaches), and on the other hand, to work with stakeholders and data provider institutions to fill the information gaps beforehand. Both milestones will boost the application of ABM and SPG modules to other fields in future research projects.

2.1.2 Aristotle University of Thessaloniki (AUTH)

Table 4. AUTH's Background.

Background	Dependencies	Exploitation intentions/ Derivative works
• Access to Greek FADN Data and data for the Greek case study • Non-linear dynamic modelling (in agriculture) • Econometric and mathematical programming, FADN informatics • Big data (extraction/fusion)	Dependencies of AUTH's IP have been identified and are to be taken into account in IP protection within AGRICORE suite licensing and derivative works.	Intentions for the following KER(s) to be appealing for future exploitation and derivative works to: • Large businesses - Yes • Open-source community - Maybe

KER3 – Database combination and fusion modules

Table 5. KER3 – Description.

KER Description	This key exploitable result refers to the development of a specific methodology for data analysis for the generation of the synthetic population for each country/ use-case of AGRICORE. In detail, AUTH will use the data provided from the FADN of the three use cases of AGRICORE (Spain, Poland, Greece) in order to generate a synthetic population for each country. Accordingly, this KER is a methodology – know-how used in the future for the assessment of agricultural policymaking measures (e.g., CAP). The KER started at TRL 4 and aimed to reach TRL 7 by the end of the project.
Type of KER	Scientific or Technological R&D Result, including ICT Hardware
Related EU Mission	Soil health and food
Needs	To raise awareness and influence policy
Keywords	• Data fusion module, • Synthetic population, • Database
Ownership	100% AUTH

Target audience (main): EU and Member State Policymakers

The main target audience is constituted of policymakers and policy officials related to agricultural, food and rural development policy areas. This also includes policymakers at regional, national and EU levels and extends to farmers & farmers associations, as well as consultancy private enterprises and advisory agencies active in relevant fields.

Exploitation routes

AUTH indicated that KER3 will be exploited following a scientific-oriented approach exclusively. This will be implemented by publications of scientific papers, PhD thesis, presentations of the methodology in scientific conferences, further research activities in the field and teaching.

Scientific exploitation: This includes all means of scientific exploitation but mainly focuses on the integration of research outputs (publications of scientific papers, presentations of the methodology in scientific conferences) and subsequent research as derivative work.

IP protection

AUTH indicated that they are interested in exploring the possibilities of an open-source license as a form for IP protection of this KER, which will be facilitated through the relevant task of AGRICORE (T8.4).

Correlation to the AGRICORE suite: This KER will constitute a dependency of the AGRICORE suite.

Key exploitation steps for KER3:

The respective research group from AUTH is highly research-active, aiming to maximise the scientific exploitation of KER3 and its involvement in the AGRICORE project in general. The agro-economic expertise of the group, together with its close collaboration with relevant stakeholders, on European, national and regional levels, as well as the alignment of the project's output with its objectives of contributing to agricultural policy development, offer a wide range of opportunities to do so.

KER3 has been developed following the work plan of the AGRICORE project and is expected to reach its final TRL by the project's end. AUTH is already pursuing to exploit the knowledge and results obtained in AGRICORE in further research activities. In collaboration with several partners, AUTH has engaged in planning derivative works, already getting funding for the BIOVALUE project that started on October 2021, directly building on AGRICORE knowledge while also being involved in more proposals for EU-funded Research and Innovation actions with relevant applications.

2.1.3 AXIA Innovation

Table 6. AXIA's Background.

Background	Dependencies	Exploitation intentions/ Derivative works
• Specialised experience in Project Management, Innovation Management, Knowledge Transfer, and Communication and Design. • Expertise in exploitation and dissemination planning for collaborative EU-funded projects. • Experience in IPR management, in particular, related to software licensing.	Dependencies of AXIA's IP have not been identified; therefore, no limitation is carried on in IP protection within AGRICORE suite licensing and derivative works.	Intentions for the following KER(s) to be appealing for future exploitation and derivative works to: • Large businesses - Yes • Open-source community - Yes

KER10 – Consultancy services in the agricultural area

Table 7. KER10 – Description.

KER Description	This Key Exploitable Result relates to the specialisation of consulting service provision for open-source software in the agricultural sector. In particular, AXIA aims to capitalise on the experience to be gained in the exploitation and innovation management of the AGRICORE tool, focusing on its application as a policy impact assessment software tool aiming at policymakers and legislators on European as well as national/regional level. The KER started at TRL 4 and aimed to reach TRL 8 or 9 by the end of the project.
Type of KER	Other intangible Results
Related EU Mission	Soil health and food
Needs	Knowledge sharing
Keywords	• Agricultural policy change • Agricultural innovation consulting • Policy assessment software exploitation • Open-source software innovation
Ownership	100% AXIA

Target audience (main): Research and Technology Organisations

The main target audience is constituted of organisations involved in policy development support and in need of agricultural innovation consulting. This is not limited only to RTOs but also includes companies, universities, policymakers, as well as relevant stakeholder organisations. Additionally, the target audience can be expanded to include relevant actors in policy assessment software exploitation as well as open-source software development in general.

Exploitation routes

AXIA's desired exploitation route for this KER would be through market-oriented exploitation.

In detail, the market-oriented exploitation includes the following activities:

- Provision of services in the agricultural sector/ to agricultural policymakers
- Relevant software license-related consulting

AXIA is aiming to exploit this result of AGRICORE by providing its services in the agricultural sector. Such services can include technology transfer and innovation management services to targeted stakeholders in agriculture as well as to relevant policymakers. The provision of IPR and innovation management services in future research projects is also included within this scope. Additionally, the experience gained in this result can be directly exploitable in the provision of specialised consulting services regarding the development of software (and in particular open-source software) and the selection of appropriate licenses for it. The potential provision of services in any derivative works of the AGRICORE Suite is also considered.

- Commercial exploitation: The expertise gained from AGRICORE can be commercially exploited with the provision of consulting services either in the field of agriculture / agricultural policy making or in the application of software development and open sourcing (or licensing in general), or in applications of policy design and policy support.
- Scientific exploitation: The involvement of AXIA in research activities, where they can provide the aforementioned services, is an already pursued aspect of its exploitation planning.

IP protection

This KER is essentially know-how and experience in service provision for which AXIA does not plan to claim any IP protection.

The KER also has no direct connection to the development of the AGRICORE suite (it will not constitute a dependency itself).

Key exploitation steps for KER10:

AXIA is aiming to exploit KER10 and, in general, its involvement in AGRICORE by offering consulting services to the aforementioned target audience. The experience gained by engaging in the respective AGRICORE activities can be further exploited by capitalising on any of its differentiation aspects or all of them. This means that this experience can be exploited either by pursuing to offer consulting services focusing on the policy support and the agricultural field relevance of the AGRICORE project to any other (future) service offering opportunity or by pursuing to offer consulting services that capitalise on the gained experience of software development licensing and open-sourcing.

KER10 was matured throughout the duration of AGRICORE. Please, note that the TRL characterisation of this KER is applicable in a more general interpretation of the term as it refers to the ability to offer consulting services.

AXIA has started to exploit this KER already within the duration of the AGRICORE project and has by now been involved in 2 more EU-funded R&I projects as a direct exploitation result of AGRICORE while also capitalising on the experience gained in AGRICORE indirectly in another 3 such projects (mostly regarding the software licensing). At the same time, AXIA has also been exploiting KER10 regardless of research projects by offering consulting services to individual stakeholders in the agriculture sector. AXIA is aiming to pursue more such opportunities to exploit KER10 in the coming years, aiming to particularly increase its R&I project participation by another 1-2 projects by the end of 2025 while also capitalising on independent non-research projects. The exploitation of AGRICORE by AXIA is projected to produce direct and indirect revenues of about 700000 EUR within the first 5 years after the end of AGRICORE and further

increase after the 5-year mark. Please note that this estimate is subject to a high degree of uncertainty.

2.1.4 University of Parma (UNIPR)

Table 8. UNIPR's Background.

Background	Dependencies	Exploitation intentions/ Derivative works
• Mathematical optimisation and agent-based modelling expertise. Experience in the development of agent-based models based on Positive Mathematical Programming. • Access to data through the Italian FADN. Restrictions apply to the use of private/ personal data; however, access is facilitated by a long-term relationship with the data provider. • Data analysis methodology to improve the synthetic population generator associated with domain knowledge on agriculture. UNIPR is the owner of this background; therefore, no restrictions either for the implementation nor the exploitation phase of the project.	Dependencies of UNIPR's IP might be identified and, in that case, will have to be taken into account in IP protection within AGRICORE suite licensing and derivative works.	Intentions for the following KER(s) to be appealing for future exploitation and derivative works to: • Large businesses - Maybe • Open-source community - Yes

KER1-B – Agent-based modelling short-period agronomic optimisation based on PMP

Table 9. KER1-B Description.

KER Description	This key exploitable result is the development and utilisation of the ABM-PMP, short-term module agronomic optimisation based on Positive Mathematical Programming and developed in GAMS. UNIPR, by extending and deepening its knowledge in this scientific area, will develop sufficient expertise to offer professional consultancy, training and agricultural advisory services to public and private stakeholders.
Type of KER	GAMS optimisation engine customisation
Related EU Mission	Not applicable
Needs	Knowledge sharing
Keywords	• Agent-modelling • Micro-simulations • Positive Mathematical Programming, • Economic optimisation, • Farm-based modelling
Ownership	100% UNIPR

Target audience (main): National and Regional Policymakers, farmers and other civil society stakeholders.

The main target audience is represented by National and Regional Policy makers, but it could also be extended to farmers and other civil society stakeholders.

Exploitation routes:

UNIPR intends to develop and streamline this ABM-PMP also beyond the AGRICORE project to support national, regional and local authorities in better designing their rural policy. The objective is to make the model more accessible and usable and also to provide consulting and

support to farmers and stakeholders while defining their agro-economic strategies considering policy and environmental constraints.

- Scientific exploitation: The upgraded version of the ABM-PMP can be used to simulate various policy scenarios or as an additional existing module in future projects.
- Consulting exploitation: The ABM-PMP module can be exploited to simulate profit-driven agents that seek the maximum revenue as a result of their actions.

KER4 – Socio-economic impact assessment module

Table 10. KER4 – Description.

KER Description	This key exploitable result relates to the mathematical formulation of the equations necessary to describe the effects of agricultural policy changes on the socio-economic characteristics of farms and rural territories. The KER started at TRL 1 and aimed to reach TRL 7 or 8 by the end of the project.
Type of KER	Scientific or Technological R&D Result, including ICT Hardware
Related EU Mission	Soil health and food
Needs	To raise awareness and influence policy
Keywords	• Impact assessment module
Ownership	100% UNIPR

Target audience (main): EU and Member State Policymakers

The target audience for this KER consists of policymakers at the regional, national and EU levels, but also the Academia and researchers from research institutions engaged in relevant research and activities in the respective field. Farmer associations could also use this module to support their activities.

Exploitation routes

UNIPR indicated that their desired exploitation route for this KER would be two-folded: a) market-oriented exploitation as well as b) scientific exploitation.

Specifically, UNIPR considers the provision of analyses of the socio-economic impacts of changes in the agricultural policy as a service to institutions/policymakers/concerned parties, upon which this service is paid for in the form of a grant or a salary. Supplementarily, UNIPR is also examining the possibility of including in their exploitation intention the a) theoretical construction of additional existing and forthcoming policy scenarios and b) providing consultancy services on the technical extension to the model, demonstrating how to work in potential use cases and benchmarking (i. e., providing an initial estimate of the results) based on the outcomes of existing use cases. The hiring of additional personnel, if resources are available, will be considered in order to facilitate the provision of consulting services to policymakers as part of a commercial exploitation plan.

The scientific-oriented exploitation mainly constitutes teaching and teaching-related activities since UNIPR is an education, research, and public engagement institution. Scientific exploitation activities also include planning for a master thesis within the respective research group of UNIPR. Scientific publications and presentations in relevant agro-economic conferences have been conducted and are also planned for the immediate future, capitalising on the work within AGRICORE.

Other Types of Exploitation: Since KER 4 is directly related to policymakers and researchers, the field of policy development and reform would be of high interest. Here, UNIPR could exploit the outcomes of this KER to inform policymaking and/or policy reform.

IP protection

UNIPR had indicated their interest in exploring various options for IP protection, especially patent, Copyright licenses or Open or copyleft licenses for derivative works. However, AGRICORE results will be completely open-source. Given the sufficient funding availability, the group is aiming to continue publishing papers in open-access journals.

Correlation to the AGRICORE suite: This KER will constitute a dependency of the AGRICORE suite.

KER11- Experience on data sources for agricultural analysis

Table 11. KER11 – Description.

KER Description	This key exploitable result consists of the possibility to exploit the knowledge acquired during the project in identifying, sourcing, and securing relevant data for (agricultural) policy analysis. The KER started at TRL 2 and aimed to reach TRL 6 by the end of the project.
Type of KER	Other Intangible Results
Related EU Mission	Soil health and food
Needs	Fellowship to advance our research
Keywords	• Impact assessment module
Ownership	100% UNIPR

Target audience (main): Academia/ Universities

KER11 has a similar target audience to KER4 but also focuses on data providers, knowledge experts, and information managers from national and international research institutions working on relevant applications in the field. The academic segment of the target audience includes mainly researchers, PhD candidates and Master students.

Exploitation routes

UNIPR indicated that their desired exploitation route for this KER would be two-folded: a) market-oriented exploitation as well as b) scientific exploitation. UNIPR is also interested in other types of exploitation, such as policy briefing.

Specifically, for market-oriented exploitation, UNIPR foresees the provision of services as the main option. In detail, the knowledge of datasets acquired and improved during the project will be instrumental in providing consultancy services to institutions or entities willing to develop their own research projects or improve their data collection processes.

In terms of scientific exploitation, UNIPR is planning to build on the experience and knowledge they have developed and enriched within AGRICORE. Workshops are envisaged to be organised (one has already been organised in May 2022) with national policymakers and researchers, and UNIPR is aiming to maintain a regular connection between those parties by iterating such contact events to facilitate knowledge transfer and support in the policymaking process. Presentations at conferences and publications of scientific papers capitalising on the knowledge obtained from AGRICORE are also planned.

For scientific exploitation, UNIPR indicated the following activities:

- Publication Conferences
- Subsequent research activities

- Teaching
- PhD thesis
- Further involvement in research. This knowledge will be quite readily exploitable in new research endeavours, allowing research contributions to be innovative and, possibly, easily publishable.

Other types of exploitation include:

- Policy brief or roadmap
- Societal activity
- Policy change

IP protection

This KER is basically a methodology-development result for which UNIPR does not plan to claim any IP protection. All AGRICORE results will be published completely open-source. Given the sufficient funding availability, the group is aiming to continue publishing papers in open-access journals.

The KER also has no direct connection to the development of the AGRICORE suite (it will not constitute a dependency itself).

Key exploitation steps for KERs 1-B, 4 and 11:

The team of UNIPR researchers participating in the AGRICORE project has gained valuable experience from their contributions to the project to add to their extensive expertise in policymaking support and agro-economics. UNIPR has been continuously active in the field of socio-economic assessment and has cultivated a consistent and valuable collaborative relationship with numerous key stakeholders and policymakers in Italy but also on the European level.

KER 1-B and 4 are expected to reach their final TRL at the end of the project, while KER11 was considered to be matured after the end of the first year of the project. Please, note that TRL characterisation for KER11 is considered in a broader sense as it refers to experience and know-how. UNIPR has been actively engaged in the exploitation of its AGRICORE results and outputs. Participation in conferences, workshops and events, as well as the publication of scientific papers and planning of all other aforementioned channels of scientific exploitation, are ongoing. The group is currently further pursuing its involvement in EU-funded research, exploiting AGRICORE.

UNIPR is also interested in pursuing more intensively their further involvement in policymaking support and will therefore invest more effort in strengthening such interactions. They are also interested in exploring a more commercially-oriented approach of service offering in this field. UNIPR intends to achieve the above throughout the collaboration with a spin-off of the "Politecnico di Milano" that delivers software solutions for several application fields. This partnership will tackle the usability and reliability of the model.

2.1.5 STAM srl

Table 12. STAM's Background.

Background	Dependencies	Exploitation intentions/ Derivative works
• Data analysis methodology. STAM brings, as an engineering company, skills related to IT services development and data analysis to the	Dependencies of STAM's IP have been identified and are to be taken into account	Intentions for the following KER(s) to be appealing for future

project. STAM is the owner of the background, so there is no limitation in the use of the background for the implementation or the exploitation phase. However, there are some legal restrictions.	in IP protection within AGRICORE suite licensing and derivative works.	exploitation and derivative works to: • Large businesses - Yes • Open-source community - Maybe

KER5- Semantic APIs and ontologies

Table 13. KER5 – Description.

KER Description	This key exploitable result has an overall goal of developing a semantic engine. The process includes the definition of the required ontologies (data model framework to sort datasets) for the characterisation of data sources that are useful for conducting a policy impact assessment in the field of agriculture. The definition of the required ontologies will enable the use of semantic technologies. The KER is directly related to the ARDIT Tool since the semantic APIs are code that will be used to retrieve information from this tool. This code is directly related to data indexing and will guide the browsing through the datasets represented within ARDIT. The KER started at TRL 6 and aimed to reach TRL 8 by the end of the project.
Type of KER	Scientific or Technological R&D Result, including ICT Hardware
Related EU Mission	Not applicable
Needs	We are sharing our knowledge
Keywords	• Ontologies • Agriculture • Semantic
Ownership	100% STAM

Target audience (main): EU and Member State Policymakers

The primary and direct focus should be placed on the exploitation of the AGRICORE Tool by policymakers and public authorities. In addition to that, other types of stakeholders can also be considered, such as agricultural/ agriculture-related associations, investors in the agricultural industry market, food-related organisations and organisations involved with climate or biodiversity policies/policymaking.

Exploitation routes:

STAM, being an SME, targets market-oriented exploitation by commercialising KER5 by providing the knowledge gained for the creation of the project ontologies as a service to potential customers but also through an internal exploitation approach, using the KER within the company to develop new ICT tools.

Commercial exploitation: Semantic services can potentially be offered anywhere the is a search interface based on a well-defined ontology. STAM has a wide portfolio of applications that leverage such services and could potentially deploy such capabilities in the near future providing new functionalities to clients

IP protection

STAM has been open to exploring all the options available and suitable for the protection of KER5, given the open-source obligations of all AGRICORE results.

Correlation to the AGRICORE suite: This KER will constitute a dependency of the AGRICORE suite.

KER6 – Georeferenced information display libraries

Table 14. KER6 – Description.

KER Description	This key exploitable result constitutes of visualisation tools used for displaying the georeferenced information resulting from the AGRICORE analysis execution. It is basically a georeferenced information system that will display and take into account location data, such as soil quality data, land use, water quality and emissions/pollution measurements. The KER started at TRL 6 and aimed to reach TRL 8 by the end of the project.
Type of KER	Scientific or Technological R&D Result, including ICT Hardware
Related EU Mission	Not applicable
Needs	We are sharing our knowledge
Keywords	• Geospatial • Sources • Upscaling • Downscaling • Georeferenced
Ownership	100% STAM

Target audience (main): EU and Member State Policymakers

The target audience for KER6 is defined as identical to that of KER5, focusing on policymakers and public authorities but also including various relevant stakeholder associations.

Exploitation route:

STAM, as an SME, aims to commercially exploit its KER within the AGRICORE project by offering the knowledge gained from creating project ontologies as a service to potential customers. Simultaneously, STAM plans to leverage the KER internally to develop new ICT tools, enhancing its own capabilities and driving innovation. This dual approach enables STAM to tap into market opportunities while utilising the KER to drive internal growth and provide value to the agricultural sector.

Commercial exploitation: The characterisation of datasets with the objective of defining a structured ontology is a key component of many applications in the STAMs portfolio.

IP protection

STAM has actively explored various suitable options for protecting the IP associated with this KER, considering the open-source obligations applicable to all AGRICORE results.

Correlation to the AGRICORE suite: This KER will constitute a dependency of the AGRICORE suite.

Key exploitation steps for KERs 5 and 6:

Both KERs were expected to reach maturity at the end of AGRICORE's duration. Regarding KER5, STAM plans to offer semantic services wherever a search interface based on a well-defined ontology exists, leveraging its diverse application portfolio to deploy these capabilities and provide clients with new functionalities. As for KER6, STAM recognises the importance of dataset characterisation and structured ontologies in their existing applications, aiming to refine and expand these datasets to develop tailored solutions for specific sectors and use cases. By following this roadmap, STAM aims to strategically position their KERs, drive market adoption, and establish themselves as a prominent player in the agricultural technology industry. Also, in terms of further R&I project involvement, STAM has already exploited their KERs in more than 3 proposals for new projects (as a direct exploitation of their AGRICORE results), while they also plan to pursue their involvement in at least 10 more such proposals within the next 5 years after AGRICORE's end.

2.1.6 IAPAS

Table 15. IAPAS' Background.

Background	Dependencies	Exploitation intentions/ Derivative works
• Database on mineral nitrogen content in Poland. However, these data can be used only if the National Chemical/Agricultural Station gives permission. Accordingly, there are restrictions on the use of these data.	Dependencies of IAPAS's IP have been identified and are to be taken into account in IP protection within AGRICORE suite licensing and derivative works.	Intentions for the following KER(s) to be appealing for future exploitation and derivative works to: • Large businesses - Maybe • Open-source community - Maybe

KER7 – Connection modules for biophysical model interconnection

Table 16. KER7 – Description.

KER Description	The connection of the AGRICORE tool with the BioMa platform will be established through the development of a dedicated model interaction module that enables the use of the extensive library of biophysical models contained in BioMa. An additional model interaction module will be developed for connecting BioMa (and potentially any biophysical model) with the ARPEGE model. In addition, extensive testing activities will be done to ensure the future straightforward connection to other biophysical models. The KER started at TRL 1 and aimed to reach TRL 6 by the end of the project.
Type of KER	Scientific or Technological R&D Result, including ICT Hardware
Related EU Mission	Adaption to climate change
Needs	We are sharing our knowledge
Keywords	• Connection modules • BioMa platform • ARPEGE, wrapper • Biophysical models • Crop modelling
Ownership	100% IAPAS

Target audience (main): Research and Technology Organisations

As the connection modules for biophysical model interconnection are part of the final AGRICORE tool, the target audience is the same as for AGRICORE Tool. Additionally, connection modules can be used by the scientific community for research purposes.

Exploitation route

IAPAS will exploit this KER with a scientific-oriented exploitation approach. IAPAS plans to use the developed software in subsequent research activities related to the connection of various crop growth models to compare their results and create a robust ensemble for producing consistent results. The developed software solution will also be used in further stages of research as a core part of the AGRICORE suite to assess impacts in the planned use case while the results of those studies will be scientifically published.

IP protection:

IAPAS indicated that they are interested in protecting KER7 through licensing. The exact type of the license will be defined in a later stage of the project once dependencies are clear and compatibility issues solved, as it will be analysed within D8.4.

Correlation to the AGRICORE suite: This KER will constitute a dependency of the AGRICORE suite.

KER8 – Environmental and climate impact assessment

Table 17. KER8 – Description.

KER Description	The goal of this KER is the development of an impact assessment module (IAM) for the purpose of evaluating 1) the impacts of agriculture on the environment and the climate and 2) the impact of climate change on how much food can be produced and where. To do so, the proposed IAM will provide two main functionalities: providing regional climatic patterns as an input to the agent-based models and computing main Key Performance Indicators (KPIs) related to the environmental and climatic impact assessment of policies. The list of KPIs to be provided by the module includes land conversion and habitat loss, wasteful water consumption, soil erosion and degradation, pollution, genetic erosion, and climate change. The KER started at TRL 1 and aimed to reach TRL 6 by the end of the project.
Type of KER	Scientific or Technological R&D Result, including ICT Hardware
Related EU Mission	Adaption to climate change
Needs	We are sharing our knowledge
Keywords	• Impact assessment • Agriculture • Environment • Climate change • Food security • Assessment of policies • Impacts of farming
Ownership	100% IAPAS

Target audience (main): Research and Technology Organisations

As the environmental and climate impact assessment module is part of the final AGRICORE tool, the target audience is the same as for AGRICORE Tool. Additionally, the environmental and climate impact assessment module can be transferred to other projects/tools/implementations for research and development purposes.

Exploitation route

IAPAS will exploit KER8 with a scientific-oriented exploitation approach. IAPAS plans to integrate the developed software, utilising the AGRICORE suite, for further research, specifically aiming to assess impacts in the intended use case. The results of these studies will be published in scientific journals.

IP protection:

As in KER7, IAPAS indicated that they are interested in protecting KER8 through licensing, as they will use the same code for both KERs. The exact type of license will be defined in a later stage of the project (and presented within D8.4) once dependencies are clear and compatibility issues are solved.

Correlation to the AGRICORE suite This KER will constitute a dependency of the AGRICORE suite.

Key exploitation steps for KERs 7 and 8:

KERs were expected to mature within the beginning of the final year of the project. In the upcoming year, IAPAS has planned to publish a scientific paper and present it at conferences, leveraging these modules to assess the impact of extreme weather conditions on crop production across different climate zones in the EU. Additionally, the connection modules will be utilised in EU-funded research projects focusing on the impact of pests and the use of pesticides on crop development and yield. Looking beyond the AGRICORE project, IAPAS intends to pursue further involvement in EU-funded research initiatives over the next five years. This commitment reflects their dedication to advancing agricultural knowledge and innovation beyond the project's duration.

2.1.7 Ayesa Advanced Technologies

Table 18. Ayesa's Background.

Background	Dependencies	Exploitation intentions/ Derivative works
• Knowledge of software development • Access to GridPilot. GridPilot is Ayesa's tool which could be used as a base where the layer of visualisation generated within AGRICORE can be integrated. For the implementation phase of the project, access rights for the use of GridPilot by Ayesa Advanced Technologies will be granted solely to the AGRICORE project partners within the frame of the project. For the exploitation phase, access rights are not granted. Therefore, an agreement should be made.	Dependencies of Ayesa's IP have been identified and are to be taken into account in IP protection within AGRICORE suite licensing and derivative works.	Intentions for the following KER(s) to be appealing for future exploitation and derivative works to: • Large businesses - Maybe • Open-source community - Maybe

KER13 – Data Warehouse design providing advanced data analytics capabilities

Table 19. KER13 – Description.

KER Description	The goal of this key exploitable result is to design and implement a data warehouse suitable for supporting the analyses examined within AGRICORE. Specifically, KER13 refers to a back-end platform that gathers data for future storage in the data warehouse. The data structure allows analysis using advanced machine learning techniques with the main target of enabling data exploitation. The data warehouse will include easy-to-manage access permissions, and its design will support both private and public cloud infrastructure deployment.
Type of KER	Scientific or Technological R&D Result, including ICT Hardware
Related EU Mission	Not applicable
Needs	Technical expertise
Keywords	• Big Data • Data • Data Warehouse • Assessment
Ownership	100% AAT

Target audience (main): Research and Technology Organisations

The main target audience is constituted of organisations looking for expertise in this kind of task undertaking. Such organisations include RTOs, universities and companies developing software solutions or looking for service provision in related applications.

Exploitation route

AYESA aims for market-oriented exploitation of KER 13, offering services externally and leveraging them internally within the company. An envisioned exploitation route entails integrating this visualisation tool into the existing proprietary platform of Grid Pilot, which originated from another H2020 project. The knowledge gained, and the developed tool can contribute to enhancing the functionalities of this established platform.

IP protection

Ayesa indicated their interest in assessing how their software could be protected considering this specific situation of Grid Pilot usage and protection, but also taking into account AGRICORE's commitment to fully open-sourcing its results.

Correlation to the AGRICORE suite: This KER will constitute a dependency of the AGRICORE suite.

KER14 – Interface tailored design and implementation for data analysis purposes

Table 20. KER14 – Description.

KER Description	This key exploitable result refers to a front-end platform that allows the visualisation of big data in order to let the user obtain conclusions and provide assessment thanks to the structure developed on any other existing back-end.
Type of KER	Scientific or Technological R&D Result, including ICT Hardware
Related EU Mission	Not applicable
Needs	Technical expertise
Keywords	• Big Data • Visualisation • Interface • Data • Data Warehouse • Assessment
Ownership	100% AAT

Target audience (main): Research and Technology Organisations

Target audience consideration for KER13 applies here as well.

Exploitation route

AYESA aims to leverage their expertise in interface design and visualisation tools (KER14) to create a user-friendly platform that allows users to obtain valuable conclusions and provide assessments by accessing and analysing large datasets. This platform can be integrated into existing systems, including the Grid Pilot project, maximising the potential for data analysis and visualisation. AYESA's exploitation strategy involves offering its services and expertise to clients who require effective big data visualisation solutions, enabling them to make informed decisions based on structured data.

IP protection

Similarly to KER13, Ayesa indicated their interest in software protection (licensing), taking into account the existing limitations of commercial exploitation due to open sourcing.

Correlation to the AGRICORE suite: This KER will constitute a dependency of the AGRICORE suite.

KER18 – Big data visualisation for analysis and assessment

Table 21. KER18 – Description.

KER Description	Provide a central data storage system for all the information compiled to allow data management assessment along with its visualisation. Data visualisation is a key factor in letting end users have a clear understanding of the assessment and conclusions provided. This Exploitation result would combine both back-end and front-end and will provide a fully working platform to make the most of data storage and visualisation synergy. Notes regarding this point: Ayesa is going to provide an architecture for information storage, but it is not centralised. There will be a centralised directory of links to the source repositories that are distributed, and then there will be local architectures that directory, and they download the information they need locally. This has been a requirement that has been requested by the rest of the partners.
Type of KER	Scientific or Technological R&D Result, including ICT Hardware
Related EU Mission	Not applicable
Needs	Technical expertise
Keywords	• Big Data • Visualisation • Interface • Data • Data Warehouse • Storage
Ownership	100% AAT

Target audience (main): Research and Technology Organisations

The target audience considered for KERs 13 and 14 is identical to that of KER18.

Exploitation routes

AYESA intends to pursue a market-oriented exploitation strategy for KER 18, with a focus on providing services and utilising the result internally within their company. The aim is to leverage their expertise in big data, interface design, and visualisation tools to cater to the needs of potential customers in various sectors. By offering advanced data analytics capabilities and user-friendly interfaces, AYESA aims to meet the demands of organisations seeking efficient data analysis solutions. Through their market-oriented approach, AYESA intends to create value and generate business opportunities by addressing the evolving needs of the data analysis market.

IP protection

Intentions for IP protection described in KERs 13 and 14 apply here as well.

Correlation to the AGRICORE suite: This KER will constitute a dependency of the AGRICORE suite.

Key exploitation steps for KERs 13, 14 and 18:

During the post-project exploitation phase of AGRICORE, AYESA will strategically focus on maximising the potential of their KERs. AYESA's exploitation roadmap entails a market-oriented approach, where they aim to offer services and solutions tailored to the needs of their target

audience. For KER 13, AYESA plans to provide services utilising the gained knowledge and tool created, potentially integrating their visualisation tool into the existing proprietary platform of Grid Pilot, thus enhancing its capabilities. Similarly, for KER 14, AYESA will position itself as a provider of innovative visualisation tools, enabling users to obtain valuable insights and conclusions from big data through a user-friendly interface. Lastly, for KER 18, AYESA will leverage their expertise in big data visualisation to offer analysis and assessment capabilities. Throughout their exploitation journey, AYESA will undertake targeted marketing, seek collaborations with relevant stakeholders, and continuously adapt to market trends, aiming to establish themselves as leading providers of advanced data analytics and visualisation solutions.

The anticipated time to market is estimated to be approximately 3 years from now, considering that Grid Pilot is already undergoing partial exploitation, and the integration of the new results generated within AGRICORE can be achieved within this timeframe.

2.1.8 Cooperativas Agro-alimentarias de Andalucía (CAAND)

Table 22. CAAND's Background.

Background	Dependencies	Exploitation intentions/ Derivative works
• Access to data from official authorities (Regional Ministry of Agriculture, Livestock, Fisheries and Rural Development of Andalucía). Restrictions apply to the use of personal data. • CAAND has around 650 partner cooperatives from different agricultural sectors, 390 of which belong to the olive sector in Andalusia. This high number of cooperatives allows CAAND to have a representative sample of the Andalusian olive sector, allowing the AGRICORE project to develop the Spanish use case, both for participatory research and for the implementation of the AGRICORE tool "in situ".	Dependencies of CAAND's IP might be identified and, in that case, will have to be taken into account in IP protection within derivative works.	Intentions for the following KER(s) to be appealing for future exploitation and derivative works to: • Large businesses - Yes • Open-source community - Yes

KER15 – Participatory research activities design for the agricultural sector

Table 23. KER15 – Description.

KER Description	This key exploitable result refers to the development of the strategy in order to implement the participatory research activities as part of the use case studies of AGRICORE. This includes the identification of the gaps, the selection of the stakeholders (policymakers, farmers, associations, policy executioners, national/regional governments) that have the knowledge required for filling such gaps and the selection of the appropriate participatory research action (e.g., surveys, interviews).
Type of KER	Services
Related EU Mission	Soil health and food
Needs	To raise awareness and influence policy
Keywords	• Participatory research • Agriculture • Interviews
Ownership	100% CAAND

Target audience (main): EU and Member State Policymakers

The target audience considered for KER15 is considered mainly consisting of relevant policymakers on the national but also possibly on the European level. An extension to that would be including RTOs active in the agricultural sector as well as the stakeholder associations themselves that can benefit from such collaborations.

Exploitation routes

CAAND, as a regional farmer association, envisions the exploitation of KER 15 by leveraging their acquired knowledge and methodology from the AGRICORE project to provide valuable consultancy services. Their focus lies in offering policy briefings and driving changes in the development of agricultural policies for public administration institutes. Through this strategic approach, CAAND aims to contribute to the advancement of the agricultural sector by utilising participatory research actions such as surveys and interviews. By engaging relevant stakeholders, including policymakers at both national and potentially European levels, as well as research and technology organisations (RTOs) and stakeholder associations themselves, CAAND seeks to foster meaningful collaborations and facilitate the transfer of knowledge and insights derived from the participatory research activities conducted within the AGRICORE project.

IP protection

CAAND indicated that their main role lies in the implementation of the participatory research activities design based on what has been planned in the project as well as to facilitate access to various datasets necessary for the implementation of the Spanish use case. Therefore, IP protection is not needed nor considered applicable in their specific case.

Correlation to the AGRICORE suite: the data generated by the participatory research will be used as inputs in the AGRICORE suite. However, there are no dependencies to consider regarding coding and software programming.

Key exploitation steps for KER15:

CAAND's key exploitation steps for KER 15 involve a comprehensive approach to leveraging their expertise and methodologies acquired through the AGRICORE project. Firstly, they will establish strategic partnerships with public administration institutes, offering consultancy services for policy briefing and agricultural policy development. Secondly, CAAND will actively engage with relevant stakeholders, including policymakers at national and European levels, as well as research and technology organisations and stakeholder associations. This collaboration will facilitate knowledge sharing and the implementation of participatory research activities, such as surveys and interviews, to identify gaps and gather valuable insights. Additionally, CAAND will prioritise disseminating their findings and recommendations through targeted channels, facilitating their broader exploitation. By taking these key steps, CAAND aims to maximise the utilisation of KER 15, contributing to the enhancement of the agricultural sector and assisting in the design of new agricultural policies. CAAND is aiming to pursue 2 publications within the coming months. The first is together with IDENER, while the second involves the data of interest from the participatory research. They have already presented the project at two events (SMART AGRIFOOD SUMMIT and FRUIT ATRACTION) and are planning to have more publications by the end of this reporting period in conferences and relevant events while also intending to continue the dissemination of key information in the post-project phase. CAAND has also been consistently presenting project progress in their own magazine, "Tierra Cooperativa".

2.1.9 Akdeniz University (AKD)

Table 24. AKD's Background.

Background	Dependencies	Exploitation intentions/ Derivative works
• Data analysis methodology. No restrictions for the implementation or the exploitation phase of AGRICORE. • Agricultural policy analysis using partial and general equilibrium models. No restrictions for the implementation or the exploitation phase of AGRICORE.	Dependencies of AKD's IP have not been identified; therefore, no limitation is carried on in IP protection within AGRICORE suite licensing and derivative works.	Intentions for the following KER(s) to be appealing for future exploitation and derivative works to: • Large businesses - Maybe • Open-source community - Yes

KER 17 – Models of agricultural products and land market

Table 25. KER17 – Description.

KER Description	This key exploitable result refers to the methodology developed in order to define optimised models for land markets, crop basis and agricultural products based on an extensive analysis of scientific literature. The goal is to develop modules that will properly consider the interaction of the agents regarding the use and transfer of land, as well as modules that enable the modelling of market interlinkages and simulate the dynamics of production market prices. These models will be adapted to the AGRICORE tool.
Type of KER	Scientific or Technological R&D Result, including ICT Hardware
Related EU Mission	Soil health and food
Needs	We are sharing our knowledge
Keywords	• Industry 4.0 • Agricultural policy analysis • Agricultural policy impact assessment using advanced modelling • Agricultural policy analysis using Industry 4.0 technology
Ownership	100% AKD

Target audience (main): EU and Member State Policymakers

KER17 is mostly aimed at relevant policymakers on the national (Turkey) and European levels. As an extension to that, RTOs active in the agricultural sector and various stakeholder associations themselves should also be considered.

Exploitation route:

AKD is aiming at an exclusively scientific- and research-oriented exploitation strategy, including the main activities listed below:

- Subsequent research activities
- Teaching
- PhD thesis
- Further involvement in research

AKD has, from the early project stages, expressed high interest in the further extension of the land and market model for Turkey after the completion of the project and in the provision of consultancy focusing on agricultural policy impact assessment to the relevant Turkish authorities

and institutions. The post-project exploitation of this KER for national applications (extending the work of AGRICORE to a Turkish case study) is desired and currently planned to be pursued.

IP protection

AKD indicated that their main outcome is a research methodology for the optimised development of modules and, therefore, will not intend to pursue any type of IP protection for KER17 in any form.

Correlation to the AGRICORE suite: The modules which will be generated by the methodology developed by AKD will be used in the AGRICORE suite. However, there are no dependencies to consider regarding coding and software programming.

Key exploitation steps for KER17:

KER17 has matured during the progress of AGRICORE and is expected to be reaching its final TRL by the end of the project. AKD is highly active in its exploitation planning for KER17. They are targeting to directly exploit their acquired experience within AGRICORE, particularly their KER, as well as the AGRICORE tool as a whole for the development of a policy impact assessment project for Turkey (aiming to submit it to the Scientific and Technological Research Council of Turkey until September 2023). Additionally, AKD is planning to launch a training program for researchers as well as policymakers interested in policy impact assessment, directly implementing the AGRICORE tool for specific policy case studies. AKD has been looking to gather experience from the AGRICORE project and the development of the use cases in an effort to make comparisons between AGRICORE and equilibrium types of models and is also planning to pursue the establishment of links between AGRICORE and such types of models. In terms of scientific exploitation output, AKD is planning to have a PhD thesis exploiting AGRICORE results within 2023 as well as the publication of a paper on the land market module, focusing on ABMs within the coming period. Finally, AKD researchers and academics are already members of the Agricultural-Policy analysis/impact assessments platform (AGMEMOD) and the agricultural policy monitoring and evaluation platform (APM, JRC-IPTS). They are expecting to be involved in more EU-funded projects in the future, capitalising on their involvement in AGRICORE and, in particular, linking ABMs with General and Partial Equilibrium based models such as AGMEMOD.

2.1.10 University of Science and Technology (UTP)

Table 26. UTP's Background.

Background	Dependencies	Exploitation intentions/ Derivative works
• Access to data through the Polish FADN. Restrictions apply to the use of private/ personal data. • Data analysis methodology, domain knowledge on agriculture, climate, and environment. Furthermore, the application of ICT to solve agribusiness and rural areas problems. UTP is the owner of the background. Therefore, no restrictions either for the implementation nor the exploitation phase of the project.	Dependencies of UTP's IP have not been identified; therefore, no limitation is carried on in IP protection within AGRICORE suite licensing and derivative works.	Intentions for the following KER(s) to be appealing for future exploitation and derivative works to: • Large businesses - Maybe • Open-source community - Maybe

KER16 – Consulting and modelling services in the agricultural area

Table 27. KER16 – Description.

KER Description	This key exploitable result refers to the utilisation of the biophysical and ecosystem services modules by offering professional consultancy reports, training, and agricultural advisory services to stakeholders in the agricultural area, such as The Agency for Restructuring and Modernisation of Agriculture (ARMA), farmers and farmers' organisations.
Type of KER	Services
Related EU Mission	Soil health and food
Needs	To raise awareness and influence policy
Keywords	• Environmental and eco-services modelling • Indicators of climate change, Determination of irrigation needs • Assessment of increase in extreme natural phenomena • Indicators of environmental pollution
Ownership	100% UTP

Target audience (main): EU and Member State Policymakers

The target audience for KER16 is mainly focused on policymakers. However, it is extended to a wide range of stakeholders, as listed below:

- Polish governmental authorities
- Regional authorities
- EU institutions and EU Commission
- NGOs and private (non-profit) organisations in the policymaking area
- Academics in the agro-economics field looking for experienced collaborators
- Farmers and farmers' organisations looking for academic consultancy and expertise to support their policymaking engagement

Exploitation route:

In terms of market-oriented exploitation, UTP aims to offer professional consultancy reports, training, and agricultural advisory services to a diverse range of stakeholders in the agricultural sector. This includes Polish governmental authorities, regional authorities, EU institutions, NGOs, private organisations involved in policymaking, academics in the agro-economics field, farmers, and farmers' organisations seeking expert guidance for their policymaking engagements. Through these consultancy services, UTP aims to provide valuable insights and support to stakeholders in shaping effective agricultural policies.

On the scientific front, UTP plans to capitalise on their expertise by incorporating relevant subjects related to KER 16 within the Management and Manufacturing Engineering study program. By teaching these subjects, UTP can impart knowledge and contribute to the development of future professionals in the field. Additionally, UTP intends to engage in scientific dissemination through publications at conferences, showcasing their research findings and insights derived from the AGRICORE project. Furthermore, UTP seeks to organise a dedicated conference for Polish stakeholders, providing a platform to present the goals, ideas, and partial findings from AGRICORE. Through these scientific endeavours, UTP aims to foster knowledge exchange, collaboration, and the advancement of agricultural practices.

By pursuing this dual approach of market-oriented exploitation and scientific engagement, UTP endeavours to maximise the impact and reach of KER 16, enabling effective consulting and modelling services in the agricultural domain and contributing to the sustainable development of the sector.

IP protection

UTP's IP protection intentions for KER 16 indicate a focus on research methodology rather than seeking explicit IP protection. While they may not actively pursue IP rights, UTP aims to maintain the flexibility to explore potential IP protection possibilities, including retaining copyrights for their KER outside the joint exploitation framework of AGRICORE. The specific IPR strategy will be further clarified at later stages of the project, allowing for adaptation and refinement as needed.

Regarding the correlation to the AGRICORE suite, the methodology developed by UTP will generate modules that will be incorporated into the suite. However, it is important to note that there are no dependencies or constraints related to coding and software programming. This flexibility enables UTP to contribute their expertise and findings to the AGRICORE suite seamlessly while allowing for independent exploration and development of their KER within the wider scope of the project.

Key exploitation steps for KER16:

The key exploitation steps for UTP's KER 16 involve a combination of market-oriented and scientific activities. Market-oriented exploitation includes organising open seminars and webinars on the impact of irrigation on ecosystem services, such as water resources, soil erosion, and nitrogen compound accumulation. Additionally, UTP aims to prepare project proposals focused on water-saving techniques and the evaluation of ecosystem services in agricultural irrigation systems, considering climate change.

Scientific exploitation goals encompass various aspects, such as estimating ecosystem service values in agriculture, assessing water demand for irrigation in relation to precipitation, and determining farmers' willingness to engage in non-irrigated agricultural production with financial compensation. UTP also plans to develop master's theses and educational modules covering topics like the influence of irrigation on soil organic matter production and enzymatic activity. They aim to introduce a new subject, "ECOSYSTEM SERVICES," to the study program and enhance existing subjects in agricultural and environmental management fields.

Additionally, UTP intends to organise the International Plant Irrigation Symposium and conduct workshops for stakeholders, including organisations like POLISH WATER, ARMIR, and the Ministry of Agriculture, to discuss irrigation development and its impact on ecosystem services. They will host regular seminars to raise awareness among producer groups about eco-services. UTP will publish scientific articles in open-access journals, covering topics such as the evaluation of ecosystem services in irrigated agriculture, willingness to pay for ecosystem services, and the supply and demand of ecosystem services among smallholder farmers in both irrigated and rainfed farming. These activities will contribute to UTP's comprehensive exploitation roadmap for KER 16.

2.1.11 Summary of exploitation roadmap

The information presented in the subsections above for each of the KERs is also summarised in the table below, providing a compact overview of the exploitation roadmap for the individual KERs of the AGRICORE consortium:

Table 28. Summary of KERs.

Partner	KER	Exploitation routes	Key steps
IDENER	KER1-A: Agent-based modelling and agent-based simulation engines	Market-oriented exploitation	Internal exploitation for other applications, provision of services, 2-3 EU-funded R&I projects and proposals (including the BIOVALUE project), Integration of KERs in future projects in agriculture or other fields in 1-2 years after AGRICORE's completion
	KER 2: Synthetic population generation from probability distributions	Scientific-oriented	
AUTH	KER3: Database combination and fusion modules	Scientific-oriented	Scientific papers, PhD thesis, presentations in conferences, subsequent research work, Exploitation via more EU-funded R&I projects and proposals (including the BIOVALUE project) in the near future
AXIA Innovation	KER10: Consultancy services in the agricultural area	Market-oriented	Provision of services, consulting for software development licensing, 6-7 EU-funded R&I projects and proposals (including the BIOVALUE project)
UNIPR	KER1-B: Agent-based modelling short-period agronomic optimisation based on PMP	Market- and scientific-oriented	Service offering, conferences, workshops, papers, EU-funded R&I projects and proposals, interactions with policymakers to provide support
	KER4- Socio-economic impact assessment module	Market- and scientific-oriented	
	KER11- Experience on data sources for agricultural analysis	Market-oriented, scientific oriented and policy briefing	
STAM	KER5- Semantic APIs and ontologies	Market-oriented	Semantic services offered, at least 13 proposals for EU-funded R&I projects up to 5 years post-project
	KER6- Georeferenced information display libraries	Market-oriented	
IAPAS	KER7– Connection modules for biophysical model interconnection	Market- and scientific oriented	Publication of papers, conference presentations, participation in EU-funded R&I projects
	KER8 – Environmental and climate impact assessment	Market- and scientific oriented	
Ayesa	KER13- Data Warehouse design providing advanced data analytics capabilities	Market-oriented	Service offering, integration with Grid Pilot
	KER14 – Interface tailored design and implementation for data analysis purposes	Market-oriented	
	KER18- Big data visualisation for analysis and assessment	Market-oriented	
CAAND	KER15 – Participatory research activities design for the agricultural sector	Policy briefing	Consultancy service offering, engagement with relevant stakeholders, publications, presentations in events, presentations via own magazine

AKD	KER 17 – Models of agricultural products and land market	Scientific- oriented	Development of policy impact assessment project for Turkey, launching of the training program, comparative assessment of AGRICORE vs equilibrium models, PhD thesis, scientific publication, involvement in future EU-funded R&I projects
UTP	KER16- Consulting and modelling services in the agricultural area	Market- and scientific oriented	Seminar/Webinar organisation, proposals on water-saving techniques/evaluation of ecosystem services in irrigation systems etc., scientific exploitation goals set, Master's thesis, education module development, the introduction of a new subject to the study program, organisation of workshops and conferences, awareness seminars

3 Conclusions

Reaching the final stages of AGRICORE's exploitation planning, the exploitation roadmap for all individual KERs has been presented in this deliverable. This roadmap consists of the updated characterisation of KER that had been presented in D8.1, enriched and extended with updated information about the consortium's intentions to exploit those results within the coming years. This deliverable should serve as complementary to the AGRICORE PEDR, where the exploitation plan of the AGRICORE tool will be further analysed and presented. Also, please note that the selection of an appropriate open-source license for the AGRICORE Suite, carried out by Task 8.4, will be presented in D8.4.

The collaborative efforts of AXIA, EXELISIS, and the AGRICORE consortium have culminated in the development of a robust Exploitation Roadmap underpinned by extensive engagement and input from all stakeholders. By extending the exploitation planning activities through WP8, the consortium has embraced a proactive approach to ensure the effective utilisation and dissemination of AGRICORE's KERs.

The Exploitation Roadmap, in conjunction with the PEDR deliverable, represents a significant milestone in the AGRICORE project's journey. The detailed characterisation of each KER, accompanied by partner-specific exploitation intentions, empowers the consortium to navigate the complex landscape of intellectual property rights, commercialisation strategies, and knowledge transfer. Through the roadmap's comprehensive framework, the consortium is poised to maximise the impact and value of the AGRICORE project, promoting evidence-based policy development, improving decision-making processes, and fostering sustainable growth within the agricultural sector.

With a forward-looking perspective, the Exploitation Roadmap not only addresses the immediate post-project exploitation planning but also lays the foundation for long-term sustainability, scalability, and further advancements of the AGRICORE tool. The consortium's commitment to transparency, collaboration, and continuous improvement ensures that the project's outcomes will continue to create a lasting legacy, driving positive change and innovation in agriculture for years to come.

For preparing this report, the following deliverables have been taken into consideration:

Table 29. Deliverables used to prepare the current report.

Deliverable Number	Deliverable Title	Lead beneficiary	Type	Dissemination Level	Due date
D8.1	Report on IPR/Exploitation Seminars	AXIA	Report	Public	M18
D8.4	Report on open-sourcing activities	AAT	Report	Public	M45
D9.1	Plan for the Exploitation and Dissemination of Results – PEDR	AXIA	Report	Confidential	M06
D9.7	Midterm Plan for the Exploitation and Dissemination of Results – PEDR	AXIA	Report	Confidential	M24