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COO...Coordinator, BEN...Beneficiary, AP...Associated Partner, AE...Affiliated Entity

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ONE EARTH

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1. Introduction

The exploitation plan is a critical component of the ONE EARTH project, ensuring that the knowledge and Intellectual Property (IP) generated from its activities are systematically managed to maximize impact and sustain results beyond the project's lifetime.

ONE EARTH partners focus on producing results that will be sustainable after the project's completion and ensuring that innovative ideas, methodologies, and results of the project will be fully identified, preserved and considered in terms of wider availability to all relevant stakeholders and, where applicable, commercialization potential. Thus, the consortium defines basic principles, from the early stages of the project, that will yield a solid management framework for the Background (BG), as well as the Foreground (FG) Intellectual Property Rights (IPR) of ONE EARTH.

The ONE EARTH plan sets the ground for monitoring the protection of IP and IPR within the consortium, which eventually will support the creation of value as regards the exploitable results of the project and facilitate successful innovation.

The plan is setting out how the following elements related to IP in ONE EARTH are to be managed within the project's context, with a view on creating a path for post-project exploitation of the relevant assets:

- Background IP
- Foreground IP
- Exploitable Results
- Access Rights
- Protection of Results
- Dissemination

The above-mentioned key concepts are normally considered for designing the Exploitation, IPR Management and Sustainability Plan of Horizon Europe projects. Definitions of these concepts are provided in the definition section below and have been communicated to all ONE EARTH partners. The current document constitutes the initial version of the Exploitation Plan (EP), elaborated as a deliverable (D6.4) of the ONE EARTH project, which has received funding from the European Union's (EU) Horizon Europe Research and Innovation Programme under Grant Agreement No 101135559.

The consortium of ONE EARTH consists of 14 partners across 9 different European countries. All the consortium partners adhere to sound data management principles to ensure that the meaningful data collected, processed and/or generated throughout the duration of the project is well-managed, archived and preserved.

The current document aims to identify the project's key assets, set the premises for the determination of their underlying IPR, as well as for the development of a common understanding regarding their exploitation framework after the end of the project.

ONE EARTH's IPR management objectives reflect the need to protect all project's assets with a view of managing efficiently all the outcomes that will stem from the project's activities and ensuring the wider availability to all relevant stakeholders. Also to identify where relevant, the commercial rollout of ONE EARTH's exploitable results after the project's completion. To this end, the main objectives of this part are the following:

- Define and agree on the ONE EARTH IPR management methodology to be followed within the context of the project.
- Identify the assets that will emerge from the activities foreseen within the lifecycle of ONE EARTH thus, determining an assets' portfolio from the early stages of the project.
- Develop a common understanding among ONE EARTH partners, concerning terms and issues of the Background (BG) and Foreground (FG) IP and respective access rights.
- Conceptualize a preliminary frame of the IP protection that will be employed in each identified exploitable result of ONE EARTH.
- Prevent and, if not possible to prevent in all cases, define and eventually dissolve any possible conflicts in IP within the consortium and beyond.
- Establish common guiding routes and actions within the consortium to safeguard the smooth operation of the IPR strategies to be implemented.

PEDAL CONSULTING SRO (PC) is responsible for the elaboration of the EP and with the support of all partners will update it through the project at M24 (D6.5) and M48 (D6.6).

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2. Definitions

2.1 Background IP

Background IP can be defined as data, know-how or information – including any rights – owned or licensed to a project partner prior to the commencement of the agreement and needed to implement the action or exploit the project’s assets. The background needed for carrying out the project activities or exploiting the underlying results must be accessible to the other project partners on a royalty-free basis. Under this frame, all project partners must identify the background as pertinent for the project actions and grant access rights to this IP. The background of a project can be identified and agreed:

Within the consortium agreement, after the internal evaluation of pre-existing knowledge, or in a separate agreement (“agreement on the background”).

In this respect, there are two main aspects to consider when dealing with the background of a project:

- Identification of background: Naming of the assets that each project partner provides to the consortium, and which are imperative for the successful implementation and exploitation of the project actions.
- Definition of Access Rights: Clarification of the rights to use knowledge under the terms and conditions agreed within the consortium and align with the underlying background rules and obligations set by the EC to ensure the smooth implementation of the project.

2.2 Foreground IP

Foreground refers to the results and assets that are generated through the implementation of project activities, including pieces of information, materials, and knowledge². These results comprise any tangible or intangible output of the project’s actions which can be protectable or not. In this respect, foreground IP can arise and be obtained from project partners to protect and exploit the underlying exploitable results of the project. It includes intellectual property rights (e.g. copyrights, industrial designs, patents), similar forms of protection (e.g. rights for databases) and unprotected know-how (e.g. confidential material). It should be noted that results generated outside the project activities cannot be defined as foreground.

ONE EARTH’s Grant Agreement establishes that results of the project are owned by the project partner who generates them. Given the collaborative nature of the project, some results can be jointly developed by several partners. In this case, joint ownership can arise among the contributing partners and is subject to the agreement on the allocation and terms of the exercise of their joint ownership. Although regulations concerning the frame of joint ownership are embedded in the ONE EARTH Grant Agreement, it would be best practice for partners to establish during the project implementation a separate joint ownership agreement to define the allocation and terms of exercising their ownership. Each joint owner can grant non-exclusive licenses to third parties to exploit the joint-owned results unless otherwise agreed in the CA or the joint ownership agreement.

2.3 Exploitable Results

Exploitation of project’s results means the utilisation of results in further research activities other than those covered by the action concerned (e.g. in other research activities; or in developing, creating and marketing a product or process; or in creating and providing a service, or in standardisation activities)³

Under this scheme, an exploitable result is defined as a project result (expected or achieved) that meets the following two conditions:

- Has commercial/social/academic relevance;
- Can be commercialised/exploited as a standalone result (e.g. product, process, service, etc.).

Therefore, exploitable results can be a combination or part of a foreground result(s). Not all foreground items may meet the above conditions.⁴ Furthermore, exploitable results are not necessary market ready; they may require further R&D, engineering and validation before becoming commercially exploitable.

2.4 Access Rights

Access rights refer to one partner’s rights for requesting access to another project partner’s background and foreground to implement its activities under the project or to use its own results. Additionally, access rights can be used if they are needed for exploiting the project’s results. The provisions governing access rights within a collaborative Horizon Europe project follow specific rules pre-defined in the Grant Agreement and the Consortium Agreement. Access rights within ONE EARTH are presented in the table below:

Purpose of access	Access to Background	Access to Results
Project implementation	<ul style="list-style-type: none"> • Royalty free • Unless otherwise agreed by participants 	Royalty free
Exploitation of Own results	<ul style="list-style-type: none"> • Subject on individual agreement • Granted under fair and reasonable conditions 	

Table 1 Access to Rights

2.5 Protection of results

It should be noted that when considering IP protection, IP assets can be protected by several types of IPR, and therefore, the most appropriate protection strategy must be chosen. The selection of the most suitable form of IP protection depends on the nature and specific characteristics of the results under consideration and the objectives of the IP owner.

There are various types of instruments that may be considered for protecting IP. Under the frame of ONE EARTH, meaningful IP protection instruments that can be used are the following:

- Trade and service marks;
- Patents;
- Utility models;
- Copyrights;
- Trade secrets;
- Confidentiality agreements.

Further details about each of the above-mentioned protection instruments are provided in the subsections below.

Trademarks and service marks

Trade Marks

A trademark is any sign that individualizes the goods of a given enterprise and distinguishes them from the goods of its competitors. This definition comprises two aspects which are sometimes referred to as the different functions of the trademark, but which are, however, interdependent and for all practical purposes should always be looked at together. To individualize a product for the consumer, the trademark must indicate its source. This does not mean that it must inform the consumer of the actual person who has manufactured the product or even the one who is trading in it. It is sufficient that the consumer can trust in each enterprise, not necessarily known to him, being responsible for the product sold under the trademark.⁵

Service Marks

In modern trade, consumers are confronted not only with a vast choice of goods of all kinds, but also with an increasing variety of services which tend more and more to be offered on a national and even international scale. There is therefore also a need for signs that enable the consumers to distinguish between the different services such as insurance companies, car rental firms, airlines, etc. These signs are called service marks and fulfil essentially the same origin-indicating and distinguishing function for services as trademarks do for goods. Since service marks are signs that are very similar in nature to trademarks, basically the same criteria can be applied. Thus, service mark protection has sometimes been introduced by a very short amendment to the existing trademark law, simply providing for the application to service marks of the provisions on the protection of trademarks.⁶

Patents

A patent is an exclusive right granted for an invention, which is a product or a process that provides a new way of doing something or offers a new technical solution to a problem. The protection is granted for a limited period, usually 20 years and serves as a title of ownership. Patent protection means that the invention cannot be made, used, distributed or sold on a commercial scale without the patent owner's consent. These patent rights are usually enforced in a court, which in most systems holds the authority to stop patent infringement. Conversely, a court can also declare a patent invalid where it is successfully challenged by a third party. On registration for the grant of rights, annual fees are charged by the relevant authorities to maintain them.¹

A patent does not give its owner the positive right to use the patented invention. Third party rights may have to be requested. Still, a patent owner has the right to decide who may or may not use the patented invention throughout the period during which the invention is protected. Moreover, the patent owner may give permission to other parties, or license them, to use the invention on mutually agreed terms. The owner may also sell the right to the invention to someone who then becomes the new owner of the patent. Finally, patents are granted only country by country, some regionally, and may also be used in non-patented territories. Once a patent expires, the protection ends, and the invention becomes part of the public domain, in the sense that the owner no longer holds exclusive rights in it, and it becomes available for commercial exploitation, free of charge, by others.²

Utility Models

In general terms, a utility model is an invention that does not meet all the requirements of patentability but has an industrial use. The inclusion of utility models into the intellectual property system in some countries has the primary objective of nurturing the rapidly evolution of indigenous innovativeness, particularly in small and medium-sized enterprises and among individuals.³

¹ See WIPO, "What is Intellectual Property", p. 5f: <https://www.wipo.int/about-ip/en/>

² See WIPO Intellectual Property Handbook 2008: Policy, Law and Use. Chapter 2: Fields of Intellectual Property Protection, p. 17.

³ See WIPO Intellectual Property Handbook 2008: Policy, Law and Use. Chapter 2: Fields of Intellectual Property Protection, p. 40.

Copyrights

Copyright is a legal term describing rights given to creators for their literary and artistic works.⁴ The kinds of work covered by copyright include literary works, such as novels, poems, plays, reference works, newspapers, computer programs, databases, films, musical compositions and choreography, as well as artistic works such as paintings, drawings, photographs and sculpture, architectural works, advertisements, maps and technical drawings. The creators of original works protected by copyright, and their heirs, have certain basic rights. They have the exclusive right to use or authorize others to use the work on agreed terms. Indeed, they can prohibit or authorize:

- its reproduction in various forms, including printed publication or sound recording.
- its public performance, as in the case of a play or musical work.
- its recording, for example on compact disc, cassette, or videotape.
- its broadcasting, whether by radio, cable or satellite.
- its translation into other languages, or its adaptation, such as that of a novel into a screenplay.

Copyright protection also includes moral rights, including the right to claim authorship of a work, and the right to oppose changes to it that could harm the creator's reputation. The creator - or the owner of the copyright in a work - can enforce rights administratively and in the courts, by inspection of premises for evidence of production or possession of illegally made "pirated" goods related to protect works. The owner may obtain court orders to stop such activities, as well as seek damages for loss of financial rewards and recognition. Finally, it is important to note that copyright only protects the expression of ideas represented in a physical embodiment, not the ideas themselves, and provided the expression is original.⁵

Trade Secrets

Trade secrets consist of confidential data, information or compilations used in research, business, commerce or industry. Universities and R&D institutions, government agencies, business entities and individuals may own and use trade secrets. The information may include confidential scientific and technical data and business, commercial or financial information not publicly known that is useful to an enterprise and confers competitive advantage on one having a right to use it. The secrecy of the information must be maintained to conserve its trade secret status. Trade secret information may be disclosed or shared under the terms of a confidentiality agreement. Confidential information may be created in sponsored research projects. In that case the sponsor will generally require the university or R&D institution and the creator to preserve the secrecy of the information. Trade secrets in the form of know-how may be vital to the working of patented inventions and other innovations. Trade secret information may have considerable value by itself or in conjunction with other forms of intellectual property. A familiar example of a trade secret is the formula for Coca-Cola. If the formula had been patented, it would no longer be a secret, as patent law requires public disclosure of the invention. Anyone who independently and legitimately discovers the secret of the Coca-Cola formula can use that discovery, and the Coca-Cola Company would have no legal means of stopping them. Some universities, however, may have reservations regarding trade secrets protection, arguing that it is hard to reconcile with openness in knowledge sharing, which is part of the academic mission.⁶

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⁴ Definition by WIPO, "What is Intellectual Property", p. 2: <https://www.wipo.int/about-ip/en/>

⁵ See WIPO Intellectual Property Handbook 2008: Policy, Law and Use. Chapter 2: Fields of Intellectual Property Protection, p. 40.

⁶ See European Commission GD Growth - trade secrets: https://intellectual-property-helpdesk.ec.europa.eu/ip-management-and-resources/trade-secrets_en

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Confidentiality Agreements

Confidentiality is an extremely important issue for participants in innovation projects, from the setting-up to the implementation and exploitation phases. Exchanging valuable information with other partners is generally a necessity that regularly occurs in collaborative initiatives or undertakings. Accordingly, confidentiality issues and measures should be taken into consideration to safely exchange information, facilitating project development and ensuring the non-disclosure of sensitive technology, business or commercial confidential information. Confidentiality agreements provide protection and more security for an organization that is about to share or make information available to another organization by ensuring that confidential information will be used only for the permitted purposes agreed between the signatories of the agreement and will not be used or revealed to third parties without consent. Therefore, the signature of a confidentiality agreement can be seen as a very important step to keep confidential information secret to maintain a competitive edge.⁷

There are specific criteria to determine a confidentiality agreement as legally enforceable:

- The information must be secret, i.e. not readily accessible to people that normally deal with this kind of information.
- It must have commercial value;
- The owner must have taken reasonable steps to protect it.

⁷ See Chapter Non-Disclosure Agreement of European IPR Helpdesk.

3. Approach

Throughout the ONE EARTH project, key IP and exploitation and sustainability management will build on the pillars of identifying a common understanding concerning the background, foreground, ownership (including joint ownership), access and usage rights, dissemination and exploitation during and after the project development. In this respect, the ONE EARTH EP plan applies on a comprehensive framework which separates the IP management processes of the project in the following stages:

- Grant Agreement preparation stage;
- Project implementation stage;
- Post-project stage.

In this respect, the following figure illustrates the IPR management stages, as considered within ONE EARTH.

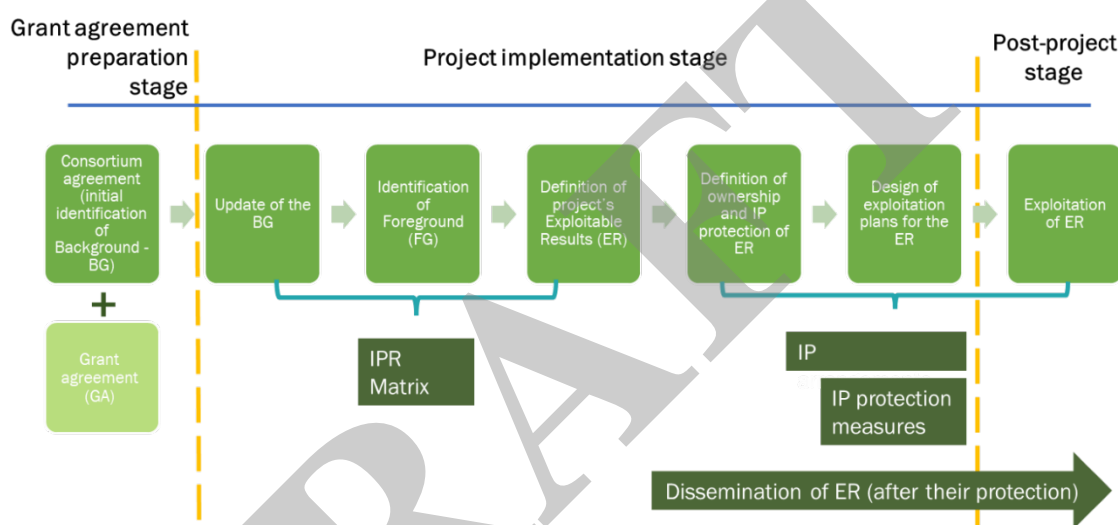


Figure 1 IPR Management stages

3.1 Preparation stage

Both the Grant Agreement and the Consortium Agreement constitute documents which include a description of several issues related to IPR. Their unique provisions represent a reference point for IPR issues within the project partners. Thus, any further advancements regarding IPR actions to put in place by project partners will be facilitated under the underlying provisions.

3.1.1 Grant Agreement

The Grant Agreement constitutes a contract which sets out the key rules and conditions of the project. It is signed between the EC and the ONE EARTH partners and represents the main contractual basis for ONE EARTH while its main points and sections which refer to IPR are included in article 16 "Intellectual property rights (IPR) — background and results — access rights and rights of use". Under this scheme, the management of the ONE EARTH IP is regulated, whereas access rights and obligations related to the background are set. In addition, the Grant Agreement defines issues concerning the ownership and protection of the project's generated results, as well as their exploitation and dissemination outcomes. Lastly, ONE EARTH GA defines transferability and access rights to results.

3.1.2 Consortium Agreement

The Consortium Agreement constitutes a contract among the partners of the ONE EARTH consortium which aims to define rights and obligations during the partnership for the purposes of carrying out the project's foreseen actions and activities.¹⁸ The Consortium Agreement minimizes the probability of later disputes as it provides rules and responsibilities during the project and defines the access rights to be granted to the partners concerning the project. In addition, it outlines rights and responsibilities among the consortium members concerning issues of the IP. The ONE EARTH Consortium Agreement main points and sections referring to IPR are included in: Section 8 "Results", that sets out provisions on ownership and joint ownership of results, as well as on their transfer and dissemination. Section 9 "Access Rights", which clarifies the access rights governing principles along with the access rights for the exploitation and dissemination purposes.

3.2 Implementation Stage

During the implementation stage of ONE EARTH, IP handling procedures are foreseen to be applied among the ONE EARTH partners to organize the results/assets management of the project. As the project continues, the focus will be on foreground identification, assets' ownership, access rights, and protection, as well as on the exploitation and commercialization of the project's results. The ONE EARTH IPR management emphasizes on establishing robust handling procedures of the IPR issues that are of strategic importance to the project to facilitate the exploitation of its results. Therefore, partners should focus on two different points:

- Providing access rights to their knowledge for other partners to carry out their work on the project.
- Establishing early asset identification procedures to protect, disseminate and exploit the project's assets.

In this respect, key IP related issues in the ONE EARTH implementation phase include:

3.2.1 Background Identification

During the first stages of ONE EARTH is vital to identify the relevant knowledge, know-how and partners' data, that constitute the background of the project. Under this framework, the underlying background could be attached to the generated assets of the project, which, eventually, will help the determination of access rights, ownership issues and IPR.

3.2.2 Foreground Identification

A core process of the ONE EARTH IP management is the project assets' identification to create a concrete mapping of the projects' assets and enhance the ONE EARTH IP portfolio. Therefore, all IP valuable assets within the project must be identified, listed, named, described and analyzed in a systematic way.

3.2.3 Results' ownership

Partners have been asked (through the ONE EARTH IPR Matrix) to elaborate further on the provisions of the Consortium Agreement regarding the results' ownership. Special attention will be paid on handling joint ownership issues.

3.2.4 Protection of results

Effective exploitation of the innovative concepts and assets developed under the frame of ONE EARTH depends on the protection of the project’s results. In particular, the project’s results must adequately be protected if:¹⁹

- The project’s results can reasonably be expected to be commercially exploited and;
- Protecting them is possible, reasonable and justified (given the circumstances).

On this note, **when considering IP protection, ONE EARTH partners must consider their own interests along with the interests of the consortium.** Project partners should safeguard the identified exploitable ONE EARTH results with adequate protection schemes, which will offer protection period within a suitable geographical territory. The geographical territory should be agreed by the parties in advance, based on where the IP will be used. By default, Europe is the suitable territory in which the identified exploitable ONE EARTH results will be safeguarded, but it remains at the discretion of the interested parties to collectively reach an agreement regarding this matter.

The table that follows, illustrates an indicative list of different protection instruments. The ones most applicable to the ONE EARTH project are marked, as considering the nature of the project, it is not expected to employ all the instruments in the list. Furthermore, additional protection instruments can be used when deemed suitable as the project activities progress.

Subject Matter	Patent	Utility	Copyright	Trademark	Confidential Information
Invention	X	X			X
Software ²⁰	X	X	X		X
Scientific Article			X		
Technology Design			X	X	
Name of Technology				X	
Know How	X	X			X
Website			X	X	

Table 2 Indicative list of protection instruments

3.2.5 Exploitation of results

ONE EARTH prioritizes ensuring the accessibility of the data collected and generated throughout the project. At present, no specialized methods, software tools, or documentation are anticipated to be necessary for accessing the data. Stakeholders will have straightforward access to the data through commonly used web browsers (such as Mozilla Firefox, Google Chrome, Internet Explorer, Safari, etc.) on their computers, smartphones, or tablets.

More specifically, they first need to access Zenodo through its webpage (following the link <https://about.zenodo.org/>) and utilize the search engine of the repository to search for interesting data. By typing the name of the project (or any other relevant keyword connected to the ONE EARTH data) the search engine will direct the user to the project’s data, ready to be explored and re-used. Moreover, since the data will be available in open formats, we will be ensuring that they can

appropriately be read by a range of different software that is widely and freely accessible to all potential users of the data.

Closed data will only be accessed by authorized project partners through the usage of a cloud storage service. Again, no specialized method, software tool and/or documentation is needed to this end.

3.2.6 Dissemination of results

ONE EARTH partners are set to select the appropriate means for the dissemination of the project's results (e.g. scientific publications, publication on web sites, conferences, open access, etc.), and in other specific confidentiality agreements. All partners should be aware that they should first ensure the protection of a project's exploitable result and then proceed to dissemination actions of the underlying result.

3.3 Post project Stage

At the project's formal conclusion in M48, the D6.6 ONE EARTH Final Exploitation Plan will be submitted. It will include the final outline of the use which the ONE EARTH consortium intends to make its exploitable foreground (including its final description and sector of application) and the related plans and time frame for their exploitation.

D6.6 will describe further the activities that will be developed to deploy the dissemination and exploitation of the project's achievements and the activities that aim to ensure the sustainability of the project's results. Additionally, D6.6 will include the final findings regarding IP issues and the final update of the IPR Matrix presenting in detail the applied and registered intellectual property rights. The deliverable will present the final advanced strategy for the exploitation and management of IPR and the sustainability after the project ends, including also the concrete chosen commercialization streams.

3.4 Role of the Exploitation Manager

The Exploitation Manager (EM) is responsible for defining the ONE EARTH's Exploitation Plan. The tasks include preparing the respective reports and ensuring that innovative ideas which come up during the project will be thoroughly examined and assessed for potential exploitation, while at the same time all project's BG and FG IPs are properly managed. To this end, the Exploitation Manager (PEDAL) will be in close communication with the Project Coordinator (UNIBO) to ensure the optimal management of all IP assets.

The Exploitation Manager and the Project Coordinator will be responsible for the organization and management issues of ONE EARTH's IPR strategy implementation. With that said, it is considered as a good practice for a partner to inform and consult the Exploitation Manager and the Project Coordinator accordingly before deciding whether to protect the results stemming from its underlying activities or not – particularly if the partner is considering a potential joint IP scheme.

Lastly, the Exploitation Manager has also a mediation role in case of IP conflicts, monitors project activities and feeds the development of the subsequent versions of this report in the context of ONE EARTH.

3.5 Knowledge Management of the project

The management of Intellectual Property (IP) is a fundamental component of the ONE EARTH project's overall management framework, requiring continuous IP monitoring throughout the project's

duration. From the outset, an effective IPR management methodology will be established to define clear procedures for handling newly generated or identified results throughout the project lifecycle.

Efficient IP management in ONE EARTH will involve a structured process to identify IP assets and ensure their appropriate handling and protection. To achieve this, mechanisms will be implemented to reliably and promptly capture IP information. When new assets are identified within specific Work Package (WP) activities, WP Leaders will notify the Exploitation Manager. The Exploitation Manager, in collaboration with the Project Coordinator and the partners involved, will oversee the assessment and management of these assets and address any related IP matters. They will guide consortium partners in developing the most effective IPR strategy, tailored to the nature of the identified asset and the goals of the ONE EARTH consortium.

To support this process, the ONE EARTH exploitation plan includes the creation and maintenance of a dynamic IPR Matrix. This living document will be regularly updated and expanded to incorporate new assets and project results, ensuring the consortium remains agile and responsive to emerging opportunities.

3.6 IP Conflicts

To proactively prevent IP conflicts, project partners will be thoroughly informed about IP regulations and guided throughout the exploitation process. This support will be provided not only using the IPR Matrix but also with the assistance and expertise of the Exploitation Manager. In this respect, project partners will identify their IPR assets, formulate their ownership and exploitation claims and if deemed necessary, transfer any relevant results to ONE EARTH's exploitable results according to the principle rights and obligations defined in the Consortium Agreement (CA) of the project.

The Exploitation Manager will help with the following indicative (and not exclusive) issues:

- Is there a possible misunderstanding about the definition of the exploitable result and therefore of the object of claims?
- Are there exploitation claims that should be further specified so that the partners can check the compatibility of their claims?
- Are the foreseen exploitation claims compatible with the ownership claims of the partners (related issue of access rights)?
- Are there any confidentiality issues e.g. on new knowledge of strategic importance for a partner and consequently the need for a confidential agreement?
- Are there any possible IP conflicts between the partners, both related to ownership and the related need for access rights and to exploitation claims?

In the event of an IP conflict, the Exploitation Manager will facilitate communication between the conflicting parties, encouraging proactive resolution and the signing of written agreements when necessary. If an agreement cannot be reached, an internal mediation process will be initiated in accordance with the provisions outlined in the ONE EARTH Consortium Agreement (CA). In case the IP issues remain unresolved after this first mediation procedure, a further mediation process in accordance with the WIPO Mediation Rules will be applied.

4. IPR Matrix Methodology

The IPR Matrix will be used in the framework of the project to define the main IPR issues related to the Exploitation and sustainability strategy. This approach will facilitate the consortium partners to identify the background, foreground, and exploitable results. In addition, the IP protection measures, and the necessary agreements will be defined to ensure the successful exploitation of the project outcomes even after the completion of the project.

The IPR methodology follows four (4) interconnected steps:

- Identification of the Background IP and definition of the access rights of the consortium partners
- Preliminary identification of the foreground IP that will be produced in the framework of the project's activities.
- Initial identification of the exploitable assets/results that will be produced in the framework of the project and the interest for their commercialization.
- Definition of the IPR protection of the identified exploitable assets/results that can be potentially commercially exploited by the consortium partners.

At this early stage of the project, the objective of the Exploitation plan of ONE EARTH is to define the main assets on the one hand and identify, to the extent possible, the FG and BG IPs of the project along with their corresponding access rights on the other hand. During the later stages of the project's implementation, the IPR methodology will be devised accordingly, to capture and integrate the involvement of the identified results and IPR approach of the project. In particular, the identification of exploitable assets would yield the need to establish an ownership regime among project partners for each one of the exploitable results. In addition, rules and conditions to get access to exploitable results need also to be considered. Finally, validation of the IPR needs to be meticulously employed. Under this framework, the structure of the IPR Matrix that will be used throughout the duration of the project is summarized in the following table.

Background (BG)	Foreground (FG)	Exploitable results (ER)
BG#	FG#	ER#
Partner's Background	Project Outcome /Achievement/Result	Exploitable result
Contributing Partner	Related WP	Main partner
Short Description of BG	Contributing Partners	Further contributing partner(s)
Type of Protection	Short Description of FG	Related FG#
How will it be utilised within ONE EARTH?	Related BG# (BG owner)	Related project task/deliverable (if applicable)
Conditions to Use within ONE EARTH	Type of Protection	Related BG# (BG owner)
Conditions to use outside of ONE EARTH	Conditions to Use within ONE EARTH	Proposition for the ER- owner
Interest in further exploitation through of ONE EARTH results	Interest in Further Commercialisation of Project Results	Short description of the ER
	Conditions to Use after the end of the Project	Relevance for IP Protection

Table 3 Structure of the IPR Matrix

4.1 Identification of Background IP

During the first stage of the IPR Matrix the Background that will be used during the implementation of the project were identified.

#	Relevant Background (the name of the Background)	Contributing Partner	BG identifier	Short description of BG	Type of protection (e.g., patent, copyright, TM, Utility model)	Conditions to use within ONE EARTH (free to use, licence fee, restrictions, NDA..)	Conditions to use outside ONE EARTH E.g. Is it confidential? Can it be shared with externals? Is it currently shared with externals? If yes on what conditions?	Interest in further exploitation through ONE EARTH's results (Yes/ No)

Figure 2 IPR Matrix Background Template

Multiple information regarding the Background IP is recorded in the respective template. In the second column of the table a short name of the Background is given. Then, the partner responsible is

mentioned, and a number is assigned related to the Work package and the number of assets. In the 5th column of the table a short more detailed description regarding the BG is offered. Furthermore, the partners define the Type of protection in terms of patents, utility models, copyrights, trade and service marks, trade secrets, creative commons licenses, confidentiality agreements, among others. In column seven (7), the partners define how this BG will be used in the framework of the project, and then in columns eight (8) and nine (9) describe the conditions under which the consortium partners and the stakeholders outside the consortium respectively can use the BG. Finally, the partners should state their interest in further exploitation of the BG in the framework of the project through the produced results.

4.2 Identification of Foreground IP

In the second stage of the IPR Matrix the partners have identified the Foreground that will be produced during the project’s activities.

WP	#	Project result (PR)/Achievement	Specific project result	Main Partner(s)	Contributing Partner(s)	Related BG number	Short description of FG	FG number	Potential IP protection	Conditions to use within ONE EARTH	Interest in Further Commercialisation	Conditions to use after the end of project

Figure 3 IPR Matrix Foreground Template

The above template is used by the consortium partners to identify the foreground IP. In the first four columns the ONE EARTH project achievements are listed along with the respective WP.

Then, the main contributing partner is mentioned. Usually, if an FG comes as a direct result of a Task, then the main partner is the Task leader. In addition, the rest of the contributing partners are also mentioned. Similarly, the contributing partners are usually the partners contributing to the Task that the FG emerges from. In the 7th column the number of the related Background IP is mentioned while in column eight (8) is given a short description of the FG. Furthermore, a Foreground number is assigned to the respective FG. Similarly, to the background identification template, the partners also define the type of protection, the conditions under which the FG can be used by the consortium partners and the interest for the commercialization through the project results.

Finally, in the last column, the conditions (e.g., free to use, license fee, etc.) to use after the end of the project shall be indicated by the project partners.

4.3 Identification of Exploitation Results

In the third stage and based on the identified FG the consortium partners will define the exploitable results and the IPR management procedures:

- Protection
- Definition of access rights
- Exploitation pathways

The main aim of this third stage of the IPR Matrix where the exploitable results and the main contributors will be defined will be:

To identify IP ownership and exploitation claims, as well as pro-actively indicate possible conflicts for each exploitable result; and to support decisions on issues pertaining to IP protection, in order to

timely make the needed steps in this regard, including any potential IP agreements (e.g. for joint ownership, providing access rights or even an NDA for confidentiality).

The next table will be used throughout the whole duration of the project in order to deploy the third stage of the IPR Matrix and identify the exploitable results.

ER#	Exploitable Result	Short description of ER	Main partner	Contributing Partner(s)	Related FG number	Related BG number	ER Owner	Potential IP protection	M	U	L	S	O	Most promising M-U-L-S-O	User	Benefits	Exploitation route	Actions for the exploitation of the ER		
																		What	Who	When

Figure 4 IPR Matrix Exploitable Results Template

In the first three columns, the number, a short name and a brief description of the exploitable results will be mentioned. In the next two columns the main responsible partner and the rest contributing partners will be listed. In column 6th and 7th, the number of the related FG and BG will be indicated.

In addition, in the next column the proposed owner of the exploitable result will be defined, while in column nine (9) the relevance for IP protection will be indicated by the responsible partner. The next five (5) columns indicate the five (5) different categories of the exploitation claims.

- M: Making a product and selling it.
- U: Using the project result internally for further development, for instance:
 - To develop something else for sale; or
 - For R&D departments (public or private) to use the results in new research projects.
- L: Licensing the project result to third parties.
- S: Providing a Service, such as consultancy, etc.
- O: Others

The partner responsible for the exploitable results with the support of the contributing partners, the coordinator and the exploitation manager shall choose which exploitation claims best fit the ER. In the final column the most promising exploitation claim shall be indicated.

5. Overview of ONE EARTH’s background and foreground

5.1 Background IP

#	Relevant Background (the name of the Background)	Contributing Partner	BG identifier	Short description of BG	Type of protection (e.g., patent, copyright, TM, Utility model)	Conditions to use within ONE EARTH (free to use, licence fee, restrictions, NDA..)	Conditions to use outside ONE EARTH E.g. Is it confidential? Can it be shared with externals? Is it currently shared with externals? If yes on what conditions?	Interest in further exploitation through ONE EARTH's results (Yes/ No)
1	The UNIBO (DICAM/DISTAL) group has the expertise for optimizing biotechnological processes at bench scale by using bioreactors with automatic control and/or shake flasks to define stoichiometries, yields and kinetics.	UNIBO	BG1	The UNIBO-DICAM group has the expertise for optimizing biotechnological processes at bench scale by using bioreactors with automatic control and/or shake flasks to define stoichiometries, yields and kinetics which be exploited for the development of the biotech processes in the frame of ONE EARTH	CC license (publication)	Free access rights for other parties oriented to implementation & use within the project framework, upon NDAs.	Confidential; Fair and reasonable conditions for other parties (if it is stipulated under a written agreement between involved parties), at exploitation in any framework.	yes

2	<p>Unibo-DICAM: a large collection of bacteria from marine and extreme desert environments has been established and is available. Some of the isolates have been screened and were shown to be able to produce LC_PUFAs after growth on minimum medium supplemented with glucose as carbon source. Moreover, different isolates can hydrolyze protein-rich substrates.</p>	UNIBO	BG2	<p>Unibo-Dicam: a large collection of bacteria from marine and extreme desert environments has been established and is available at DICAM. Some of the isolates have been screened and were shown to be able to produce LC_PUFAs after growth on minimum medium supplemented with glucose as carbon source. Moreover, different isolates can hydrolyze protein-rich substrates. The above-mentioned isolates will be screened for their ability to grow and produce LC-PUFAs in the presence of VFAs as carbon source. The isolates will also be tested for their ability to use protein-rich materials (chicken feather, fish bones and scales) as substrate to produce bioactive hydrolysates.</p>	CC license (publication)	<p>free to use upon Signing of MTAs (Material Transfer Agreements), NDAs (Non-disclosure Agreements). UNIBO DICAM keeps the rights of property of bacterial isolates.</p>	<p>Licensing; Once developed the product, we could foresee some royalties or lump sums, whether it could have commercial potential within the industry sector. In addition, we can foresee a “Right of first refusal” for companies involved in the project, to facilitate the technology transfer within the Consortium. UNIBO DICAM keeps the rights of property of bacterial isolates.</p>	yes
3	<p>UNIBO-DISTAL background is composed by microbial strains belonging to the species producers of (P)UFA starting from SCFA produced from whey. Moreover, UNIBO background regards the application of high-pressure processing (HPH) for cell treatments.</p>	UNIBO	BG3	<p>UNIBO-DISTAL background is composed by microbial strains belonging to the species producers of (P)UFA starting from SCFA produced from whey. Moreover, UNIBO background regards the application of high-pressure processing (HPH) for cell treatments and disruption.</p>	CC license (publication)	<p>Free access rights for other parties oriented to implementation & use within the project framework, upon an MTA/NDA. UNIBO keeps owning property rights of the microbial strains.</p>	<p>Fair and reasonable conditions for other parties (if it is stipulated under a written agreement between involved parties), at exploitation in any framework. UNIBO keeps owning property rights of the microbial strains.</p>	yes

4	<p>UNIBO. CHIMIND: More than 15 years expertise on life cycle assessment, with specific application to waste management, circular economy systems, biorefineries, valorization of bio-waste. Use of different licensed tools, software and database (SimaPro, Sphera, OpenLCA, ecoinvent, and others) Expertise on complementary methodologies supporting environmental sustainability (e.g. material flow analysis)</p>	UNIBO	BG4	<p>More than 15 years expertise on life cycle assessment, with specific application to waste management, circular economy systems, biorefineries, valorization of bio-waste. Use of different licensed tools, software and database (SimaPro, Sphera, OpenLCA, ecoinvent, and others) Expertise on complementary methodologies supporting environmental sustainability (e.g. material flow analysis). Knowledge on process and equipment analysis with experimental and computational methods, at the global and local scale.</p>		<p>According to Sections 8 and 9 of this Consortium agreement.</p>	<p>According to Sections 8 and 9 of this Consortium agreement.</p>	
5	<p>No data, know-how or information of BOLTON FOOD is Needed by another Party for implementation of the Project (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", subsection "Access rights to background and results for implementing the action") or</p>	BOLTON FOOD	BG5	<p>No data, know-how or information of BOLTON FOOD is Needed by another Party for implementation of the Project (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", subsection "Access rights to background and results for implementing the action") or Exploitation of that other Party's Results (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background",</p>				

	Exploitation of that other Party's Results (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", sub-section "Access rights for exploiting the results").			sub-section "Access rights for exploiting the results").			
6	No data, know-how or information of GESCO is Needed by another Party for implementation of the Project (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", sub-section "Access rights to background and results for implementing the action") or Exploitation of that other Party's Results (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", sub-	GESCO	BG6	No data, know-how or information of GESCO is Needed by another Party for implementation of the Project (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", sub-section "Access rights to background and results for implementing the action") or Exploitation of that other Party's Results (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", sub-section "Access rights for exploiting the results").			

	section “Access rights for exploiting the results”).							
7	Molecular techniques for the study of biomarkers	ANFACO	BG7	Molecular techniques for the study of biomarkers		Only to be used for the purposes of the project and in accordance with property, access, and confidentiality clauses in this Consortium Agreement	Under fair and reasonable conditions and in accordance with property, access, and confidentiality clauses in this Consortium Agreement	
8	No data, know-how or information of CROMARIS is Needed by another Party for implementation of the Project (Article 16.1 and its Annex 5 Grant Agreement, Section “Access rights to results and background”, sub-section “Access rights to background and results for implementing the action”) or Exploitation of that other Party’s Results (Article 16.1 and its	CROMARIS	BG8	No data, know-how or information of CROMARIS is Needed by another Party for implementation of the Project (Article 16.1 and its Annex 5 Grant Agreement, Section “Access rights to results and background”, sub-section “Access rights to background and results for implementing the action”) or Exploitation of that other Party’s Results (Article 16.1 and its Annex 5 Grant Agreement, Section “Access rights to results and background”, sub-section “Access rights for exploiting the results”).				

	Annex 5 Grant Agreement, Section "Access rights to results and background", sub-section "Access rights for exploiting the results").						
9	Know-how and processes for the production of oleogenic strains and PUFA's using a range of strains including yeasts, and marine microorganisms. Know-how on the cultivation of different various microorganisms on mixtures of volatile fatty acids or short chain carboxylic acids, generated in different conditions, including anaerobic digestion, acidogenic fermentation, and also using other side-streams.	BIOTREND	BG9	Know-how and processes for the production of oleogenic strains and PUFA's using a range of strains including yeasts, and marine microorganisms. Know-how on the cultivation of different various microorganisms on mixtures of volatile fatty acids or short chain carboxylic acids, generated in different conditions, including anaerobic digestion, acidogenic fermentation, and also using other side-streams.	Biotrend will deliver material required for the project implementation and disclose to the relevant partner processing information as strictly required for the successful implementation of the workplan. The use of material delivered by Biotrend or information shared by Biotrend outside of the consortium are restricted and a specific agreement is required.	Exploitation Agreements will define the basis on which licenses or sub-licenses are made available so as to allow for deployment of the technology for the benefit of end-users in the consortium or to further clients.	yes

10	No data, know-how or information of VITO is Needed by another Party for implementation of the Project (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", subsection "Access rights to background and results for implementing the action") or Exploitation of that other Party's Results (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", subsection "Access rights for exploiting the results").	VITO	BG10	No data, know-how or information of VITO is Needed by another Party for implementation of the Project (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", subsection "Access rights to background and results for implementing the action") or Exploitation of that other Party's Results (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", sub-section "Access rights for exploiting the results").				
11	Know how (non-exhaustive) Formulation of food supplements and cosmetics. Upscaling lab processes to industrial relevant equipment.	ANAVERIS	BG11	Knowhow of formulating food supplements and cosmetics, and the expertise to adapt laboratory procedures for efficient production using industrial scale equipment.		Proprietary formulations, stability tests and microbiological challenge test results. Certain background and knowledge may be subject to legal restrictions or limits, including those imposed by the rights of third parties.	Fair and reasonable market conditions to be agreed upon in a separate agreement if needed for commercial exploitation	YES

12	No data, know-how or information of UNIVPM is Needed by another Party for implementation of the Project (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", sub-section "Access rights to background and results for implementing the action") or Exploitation of that other Party's Results (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", sub-section "Access rights for exploiting the results").	UNIVPM	BG12	No data, know-how or information of UNIVPM is Needed by another Party for implementation of the Project (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", sub-section "Access rights to background and results for implementing the action") or Exploitation of that other Party's Results (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", sub-section "Access rights for exploiting the results").		According to specific sections of the Consortium agreement	According to specific sections of the Consortium agreement	YES
13	Knowledge gained during the INGREEN project, in which we have studied the characteristics of our main byproduct, the whey of Squacquerone and its possible use as a new ingredient. We have collected several analyses on this whey,	MAMBELLI	BG13	Knowledge gained during the INGREEN project, in which we have studied the characteristics of our main byproduct, the whey of Squacquerone and its possible use as a new ingredient. We have collected several analyses on this whey, searching fundamental parameters for its		According to Sections 8 and 9 of this Consortium agreement.	According to Sections 8 and 9 of this Consortium agreement	YES

	searching fundamental parameters for its characterization, that will be use during also ONE-EARTH project			characterization, that will be use during also ONE-EARTH project				
14	Knowhow and technology for producing high quality aquafeeds	AAR	BG14	Aller Aqua is a globally recognized aquafeed company that has been dedicated to producing high-quality aquafeed for six decades. The company formulates feed for over 30 different aquaculture species and markets its products in more than 70 countries worldwide.				
15	No data, know-how or information of FOREL is Needed by another Party for implementation of the Project (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", sub-section "Access rights to background and results for implementing the action") or Exploitation of that other Party's Results (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background",	FOREL	BG15	No data, know-how or information of FOREL is Needed by another Party for implementation of the Project (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", sub-section "Access rights to background and results for implementing the action") or Exploitation of that other Party's Results (Article 16.1 and its Annex 5 Grant Agreement, Section "Access rights to results and background", subsection "Access rights for exploiting the results").				

	subsection “Access rights for exploiting the results”).							
16	No data, know-how or information of PEDAL is Needed by another Party for implementation of the Project (Article 16.1 and its Annex 5 Grant Agreement, Section “Access rights to results and background”, subsection “Access rights to background and results for implementing the action”) or Exploitation of that other Party’s Results (Article 16.1 and its Annex 5 Grant Agreement, Section “Access rights to results and background”, subsection “Access rights for exploiting the results”).	PEDAL	BG16	No data, know-how or information of PEDAL is Needed by another Party for implementation of the Project (Article 16.1 and its Annex 5 Grant Agreement, Section “Access rights to results and background”, subsection “Access rights to background and results for implementing the action”) or Exploitation of that other Party’s Results (Article 16.1 and its Annex 5 Grant Agreement, Section “Access rights to results and background”, subsection “Access rights for exploiting the results”).				

17	Know-how and processes for the production of biocatalytic columns for proteolysis	FHNW	BG17	Method for producing monolithic silica-based materials as solid-phase to construct continuous biocatalytic reactors	trade secret	Free to use upon Signing of MTAs (Material Transfer Agreements), NDAs (Non disclosure Agreements). FHNW keeps the rights of property of proteolytic biocatalytic reactors.	Confidential; Fair and reasonable conditions for other parties (provided that it is stipulated under a written agreement between involved parties)	yes
18	Know-how and processes for bubble-free aeration and degassing of aqueous solutions (e.g. microalage cultivation), allowing a way better room-time-yield, better growth rates and a controlled concentration of any desired dissolved gas at almost every concentration from 0 to max. solubility under the applied conditions	FHNW	BG18	Membrane contactor technology is a well-described technology for degassing of e.g. brewing water. It is, however, not yet widely used in aqueous solutions containing high(er) concentration of biomass (e.g. microalage solutions or manure). With the use of dedicated tubular PTFE membranes and their incorporation in membrane modules we can provide a controlled (dissolved-)gas management at almost every concentration. The membrane contactors we use are scalable and thanks to 3D-printing fully adaptable at almost every required geometry (e.g. tubular reactors).	3D printing is patented from MemO3 GmbH. We can use this technology	Free to use for non-commercial applicaitons	Outside of one earth, the membrane contactor technology needs to be ordered from Memo3 GmbH (Swiss Company)	yes

5.2 Foreground IP

A preliminary identification of the Foreground IP took place during the initial stages of the project and can be found in the table below. Additional updates or modifications are expected in the Final Exploitation Plan D6.6, which will correspond to the progress of the project and the produced results and knowhow.

WP	#	Project result (PR)/ Achievement	Specific project result	Main Partner(s)	Contributing partner(s)	Related BG number	Short description of FG	FG number	Type of protection (e.g., patent, copyright, TM, Utility model, CC licence)	Conditions to use within ONE EARTH (free to use, licence fee, restrictions, NDA..)	Interest in Further Commercialisation of Project Results (Yes/ No)	Conditions to use after the end of project (free to use, licence fee, restrictions, NDA..)
WP2	T2.4	SO5.1	SO5.1	VITO	-	BG9	Enzymatic esterification of PUFAs	FG1	Patenta depending on outcomes	See CA	Yes	License fee or NDA case by case
WP2	T2.1	Bacteria producing (LC)-PUFAs from VFAs selected and the production protocol optimized at lab scale		UNIBO	UNIBO	BG2	bacterial isolates producing high amount of (LC)-PUFAs after growth on volatile fatty acids enriched by cheese whey fermentation selected and the protocol for the biotechnologi	FG2.1	CC licence, patent	Signing of MTAs (Material Transfer Agreements), NDAs (Non-disclosure Agreements). UNIBO DICAM keeps the rights of property of bacterial isolates.	yes	Licensing fees; UNIBO DICAM keeps the rights of property of bacterial isolates

							cal production process optimized at lab scale (in a flask).					
WP2	T2.2	yeast strains producing (P)UFAs and the production protocols of (P)UFAs-enriched biomass optimized at lab scale		UNIBO	UNIBO	BG3	yeast strains producing (P)UFAs and the protocol for the biotechnological production process of PUFAs-enriched biomass optimized at lab scale	FG2.2	CC licence, patent	Signing of MTAs (Material Transfer Agreements), NDAs (Non-disclosure Agreements). UNIBO DISTAL keeps the rights of property of yeast microbial isolates.	yes	Licensing fees; UNIBO DISTAL keeps the rights of property of yeast microbial isolates.
WP2	T2.2	Scalable process to produce PUFA-rich microbial biomass using VFAs as carbon source	SO1	BIOTREND	-	BG9	Process strategy (including cultivation parameters, medium composition, feeding profiles, controls) for maximizing	FG2.3	Internal know-how. Patent if specific biomass composition can be fixed.	Defined in CA	yes	License fee

							the productivity of production of PUFA-rich biomass using VFAs as carbon source					
WP3	T3.1	Bacteria producing bioactive hydrolysates from chicken feather, fish bones and/or fish scales selected and the production protocol optimized at lab scale (TRL3)		UNIBO	UNIBO	BG2	bacterial isolates able to produce bioactive hydrolysates (exhibiting antioxidant, antimicrobial activities...) from chicken feathers, fish bones and/or selected and the protocol for the biotechnological production process optimized at lab scale (TRL3).	FG3.1	CC license, patent	NDA (Non-disclosure Agreements). UNIBO DICAM keeps the rights of property of bacterial isolates.	yes	Licensing fees.

WP3	T3.2	Bacteria producing bioactive hydrolysates from chicken feather, fish bones and/or fish scales selected, and the production protocol optimized at pilot scale (TRL 4)		UNIBO	UNIBO	BG2	bacterial isolates able to produce bioactive hydrolysates (exhibiting antioxidant, antimicrobial activities...) from chicken feathers, fish bones and/or selected and the protocol for the biotechnological production process optimized at pilot scale (TRL4)	FG3.2	CC license, patent	NDA (Non-disclosure Agreements). UNIBO DICAM keeps the rights of property of bacterial isolates.	yes	Licensing fees
WP3	T3.3	Systems for chemical hydrolysis of proteins		FHNW			Specifically designed processes and chemical allowing for proteolysis.	FG3.3	patent, trade secret	NDA. FHNW retains the rights of property of novel processes and hydrolytic systems	yes	Licensing fees
WP3	T3.4	Systems for biochemical		FHNW		BG17	Specifically designed processes and	FG3.4	patent, trade secret	NDA. FHNW retains the rights of	yes	Licensing fees

		hydrolysis of proteins					biochemical systems allowing for proteolysis.			property of novel processes and hydrolytic systems		
WP2	T2.5	Production of aquaculture feed using PUFAs obtained at TLR5		BIOTREND		BG14	All test diets produced will be isoproteic, isolipidic and isoenergetic with the inclusion of PUFA materials provided by the partner.	FG3.5	Patent, trade secret	NDA	yes	NDA
WP4	T4.3	Formulation and industrial up-scaling of nutraceutical prototypes		ANAVERIS		BG11	The most promising fractions of PPs and PUFAs in terms of functional properties and commercial opportunity will be used in the production of prototype nutraceutical formulations	FG4.1	Trade secret	NDA, ANAVERIS SA retains the rights of property of novel processes and formulation systems	yes	Licensing fees

							and industrial up-scaling.					
WP4	T4.3	Formulation and industrial up-scaling of cosmetic prototypes		ANAVERIS		BG11	The most promising fractions of PPs and PUFAs in terms of functional properties and commercial opportunity will be used in the production of prototype cosmetic formulations and industrial up-scaling.	FG4.2	Trade secret	NDA, ANAVERIS SA retains the rights of property of novel processes and formulation systems	yes	Licensing fees
WP4	T4.3	PUFA stabilization in Nanostructure d lipid carriers (NLC)		ANAVERIS		BG11	PUFAs will be stabilized in Nanostructure d lipid carriers (NLC) and used for the formulation of nutraceutical	FG4.3	Trade secret	NDA, ANAVERIS SA retains the rights of property of novel processes and	yes	Licensing fees

							prototype products.			formulation systems		
WP5	Subtask 5.2.2	Thermodynamic analysis of the most promising industrial biorefinery design solution		UNIBO	UNIBO	BG4	The thermodynamic analysis of the process derives from mass and energy conservation equations applied to the specific design solution identified in the project				no	Free to use
WP3	T3.3	Organic fertilizer production		UNIVPM		BG12	The CF, FB, fish entrails and the leftovers from the acidogenic fermentation processes will be copyrolyzed to obtain biochar to be valorized as P based fertilizer or as soil improver	FG3.3	Patent, licence on depending on outcomes	Defined in CA	yes	Licensing fees/free to use on depending on outcomes

							for slow carbon release.					
WP4	T4.1	Requirements on Target Compounds		ANAVERIS		BG11	Technical specifications for target compounds will be established based on a review of relevant literature and applicable regulations for food and cosmetic products.	FG4.4	Trade secret	NDA, ANAVERIS SA retains the rights of property of technical specifications	yes	Licensing fees

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5.3 Individual Exploitation Plans

This section summarizes, in tabular format, the assets of the ONE EARTH project that each partner is currently interested in exploiting the most, as well as how they intend to proceed to this end.

UNIBO	Preliminary individual exploitation strategy
<p>UNIBO seeks to use the research performed in this project to create new collaborations, both within academia and industries, that will lead to the development of patentable protocols and processes. Moreover, the data obtained will generate new knowledge which will be useful for the agri-food sector and related to the recovery and valorization of food waste and by-products into new and functional ingredients, in the context of the bioeconomy. Furthermore, UNIBO will a) acquire knowledge about environmental impacts of the proposed technology throughout a life cycle thinking perspective, b) improve the dataset on agrifood waste valorization into value-added substances in line with the green chemistry principles, c) improve the capacity of evaluating the social and economic sustainability of innovative pathways, and d) expand the knowledge on biowaste valorization in the agrifood sector.</p>	
FHNW	Preliminary individual exploitation strategy
<p>Innovative photosynthetic bioprocesses may represent an interesting approach to capture CO₂ biologically and offer perspective in terms of IP and commercial valorization. It is anticipated that biochemical reactors that are capable of concurrent proteolysis and separation will be particularly beneficial for upcycling protein waste into valuable chemicals. In addition, selective, robust and scalable chemical reactions for peptide cleavage and modification will be developed. FHNW will strive to demonstrate the feasibility of those approaches and to translate them into industrial application.</p>	
MAMBELLI	Preliminary individual exploitation strategy
<p>Mambelli is a cheese whey supplier within the value chain of the ONE EARTH project. The possible outcome that could be exploited is about an alternative use of the whey, different than the application in pig farming, which presently does not offer any added value.</p>	
FOREL	Preliminary individual exploitation strategy
<p>As one of the first companies in Ukraine to produce trout that has earthy ponds, RAS of closed type and blocks, R&PC FOREL main exploitation interest is to use of feed for farmed fish (trout, sturgeon, carp). Preventive measures will increase the profitability of production, expand markets, including Europe, and produce safer products. This will lead to strengthening the competitive position of company. In addition, the company is interested in the production from fish waste. Furthermore, the results of research on this project will facilitate the establishment of new collaborations both with academic institutions and with the biotechnological and feed sectors, which in turn can lead to the emergence of new chains of targeted consumer goods and the creation of additional jobs.</p>	
VITO	Preliminary individual exploitation strategy
<p>The steryl- and dihydroconiferyl PUFA esters produced in ONE EARTH can be used as antimicrobial, antioxidant, and anti-inflammatory compounds in cosmetics and personal care</p>	

products. In addition, due to their natural and biobased origin and the fact that they will be produced in a greener way (enzymatic conversion under solvent free conditions), will increase their marketing value in these two sectors.

AAR	Preliminary individual exploitation strategy
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AAR intends to produce fish feed formulations with either incorporated or coated test material to demonstrate an improved performance and/or health status and/or higher value of final product (fish fillet). AAR seeks competitive advantages in the feed sector by obtaining economic formulations, by including directly PUFA-rich biomass instead of extracted PUFAs in fish feed.

ANFACO	Preliminary individual exploitation strategy
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The results obtained by ANFACO will allow the validation, at industrial scale, of alternative European seabass (*D. labrax*) diets, i.e., the discrimination of those who are optimal for the health and growth of this species, as well as for the improvement of the nutritional quality of the fish meat. In other words, the adequacy of the purified PUFA (obtained from marine bacteria and yeast) used in the formulation of these diets will be tested versus a control diet (rich in fish oil). These results will be disseminated (WP6) and will be available for the industry (fish feed manufacturers, fish farms, consumers, etc.).

PEDAL	Preliminary individual exploitation strategy
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PEDAL will leverage the methodologies and approaches developed within the project to enlarge its portfolio of services and solutions. Further, PEDAL seeks to enhance its expertise to better support the business, innovation as well as internationalization endeavors of its clients.

ANAVERIS	Preliminary individual exploitation strategy
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ANAVERIS intends to use the results of the project to get a competitive edge in the market of food supplements and cosmetics producing innovative products. Lately the Personal care and Nutraceuticals industry is more and more focusing on environmental awareness and sustainability. ANAVERIS is currently using keratin, collagen and PUFAs in cosmetics and food supplements, therefore an upcycled version of these ingredients may provide an advantage over competition.

BIOTREND	Preliminary individual exploitation strategy
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Development of fermentation processes based on raw materials rich in carboxylic acids (ex. various food industries, anaerobic digestion leachates, etc.). BIOTREND usually operates on a fee-for-service business model, offering highly specialized contract research or consultancy for evaluation of the potential of the conversion of different raw materials. Further, BIOTREND is open to potential joint ventures with partners willing to move to commercial scale.

GESCO	Preliminary individual exploitation strategy
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By aiming at process optimization waste reduction, GESCO will deploy ONE EARTH innovations to increase the reuse of by-products and process them into new resources.

5.4 Exploitation Results at this stage

ER#	Exploitable Result	Short description of ER	Main partner	Contributing Partner(s)	Related FG	Related BG	ER Owner(s)	Potential IP protection	M	U	L	S	O	M	Intended users	Benefits	Potential exploitation routes	Actions for the exploitation of the ER		
																		What	Who	When
1	Pilot scale PUFA and VFA production	Achievement in advancing PUFA production to TRL5, underpinned by process optimizations and extraction techniques, by also assessing the development of VFA production at TRL5.	UNIVPM, BIOTREND	UNIBO, VITO		BG1, BG2, BG9	BIOTREND	YES		x	x	x	X	S	cosmetics, nutraceuticals, bio adhesives, food/feed producers, oleochemical sector	increase sustainability of processes, shorter supply chains, no competition with food and feed	Process development services, scale-up services, engineering services, joint-ventures for large scale implementation	validation of the integrated VFA production and conversion into PUFAs at successively larger scales. Thorough technical-economic assessment.	BIOTREND	within 5 years after the project
2	PUFA Esters production	A paradigm shift in understanding the enzymatic synthesis dynamics of PUFA esters, captured in a process knowledge package, bridging theoretical concepts with practical applications.	VITO	-	FG1	BG10	VITO	YES		X	x	x	x	S	Producers of ingredients for personal care and cosmetics, and healthcare.	More competitive market positioning thanks to an increased sustainability profile and opportunity to obtain "natural" label	-	IP protection or Dissemination depending on nature of result application testing of product Sustainability assessment and LCA Promotion toward prospect groups	VITO	within 5 years after the project

3	(P)UFAs-enriched microbial (bacterial, yeast) biomass production	optimized protocols for biotechnological processes to produce (P)UFAs-enriched microbial (bacterial, yeast) biomass using VFAs as substrate	UNIBO	UNIBO, BIOTREND	FG2.1; FG 2.2	BG2, BG3, BG9	UNIBO, BIOTREND	patent, licence	CC		x	x	x		U, L	cosmetics, nutraceuticals, bioadhesives, food/feed producers	biobased diversified products, increase market sectors, interconnection between producers of the waste/byproduct and final producers/users; increase sustainability of the biotechnological processes	cosmetics, nutraceuticals, bioadhesives, food/feed production industries	further R&D (characterization of the final products), prototyping, validation in industrial environment	actors of the value chains from the waste/byproduct provider to the end-user; policy makers, marketing operators	during the project duration and maximum 2 years after the end of the project
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4	Peptides production	Bioactive hydrolysates enriched in peptides exhibiting different functionalities (antioxidant, antimicrobial ...) obtained by microbial routes from protein-rich materials (chicken feather, fish bones and scales) TRL3/4	UNIBO	UNIBO	FG3.1; FG 3.2	BG2	UNIBO	patent, licence	CC	x	x	x	x	U, L	cosmetics, nutraceuticals, bioadhesives, food/feed producers	biobased diversified products, increase market sectors, interconnection between producers of the waste/byproduct and final producers/users; increase sustainability of the biotechnological processes	cosmetics, nutraceuticals, bioadhesives, food/feed production industries	further R&D (characterization of the final products), prototyping, validation in industrial environment	actors of the value chains from the waste/byproduct provider to the end-user; policy makers; marketing operators	during the project duration and maximum 2 years after the end of the project
5	Organic fertilizer production	Also, project delves deep into optimized organic fertilizer production at TRL5.	UNIVPM		FG3.3	BG12	UNIVPM	patent, licence	x	x	x	x	M, U	fertilizers producers and agricultural sector	biobased fertilizers diversified products, increase market sectors, synergic circular approach between different productive sectors; interconnection between producers of the waste/byproduct and final	biobased fertilizers production industries	further R&D (characterization of the final products especially in terms of agricultural proprieties), evaluation of sustainability assessment and LCA, identification of potential legislative restrictions; validation in	actors of the value chains from the waste/byproduct provider to the end-user; policy makers; marketing operators	during the project duration and maximum 3-5 years after the end of the project	

8	LCA and Socioeconomic assessments	Robust assessments evaluating the environmental footprints and circularity virtues of the ONE EARTH biorefinery concept. Accompanied by insightful socio-economic evaluations, these reports are intended to serve as quintessential resources for steering sustainable biorefinery transformations.	UNIBO	PEDAL	5.2.2	BG.4	UNIBO		x				x						
9	Policy recommendations	A policy-shaping document offering a deep-dive analysis of prevailing legal paradigms and proposing strategic recommendations, primed to influence and reshape regulatory landscapes will be developed.																	

10	Scientific Publications, presentations and data	An expansive academic treasure trove, curated from rigorous research and investigations, covering articles, training modules, conference insights, and open datasets. Each piece stands testament to the project's commitment to knowledge dissemination and domain advancement.																
11	Peptide production using chemical or biochemical hydrolysis	A method for producing specific peptides or protein hydrolysates using novel chemical or biochemical systems	FHNW		FG3.3 & 3.4	BG17	FHNW	patent		x				Peptide production		Further R&D	FHNW	At the completion of the project
12	Production of aquafeed using PUFA ingredients	Based on the results of the feeding trials, AAR will commercialize the product containing active PUFA components.	BIOTREND		FG3.5	BG14	AAR	patent, NDA		x				Fish farmers				

6. Conclusion and way forward

The **PRELIMINARY EXPLOITATION PLAN (D6.4)** outlines the key elements of the IPR strategy, the methodology applied, and provides an overview of the project's assets, including background and foreground IP. To support the effective identification and management of ONE EARTH's assets, a specialized tool—the IPR Matrix—has been applied under the guidance of the Exploitation Manager (PEDAL).

The Exploitation Manager is tasked with ensuring the plan remains up-to-date and effective. Responsibilities include: a) monitoring project activities as they progress, b) identifying innovation opportunities that might otherwise be overlooked, and c) addressing potential conflicts of interest to facilitate their resolution before the project's conclusion. This proactive approach aims to ensure the smooth and effective exploitation of ONE EARTH results beyond the project's lifecycle.

D6.4 will be updated in M24 (D6.5) and M48 (D6.6), reflecting the latest developments regarding project results, including their identification, protection types, ownership, and access rights. Supported by all project partners, the updated versions will provide a comprehensive framework for the exploitation of ONE EARTH's assets, promoting the sustainability and continued impact of its outcomes.

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