



GEO-CRADLE H2020 SC5-18b-2015, GA No. 690133

## Coordinating and integrating state-of-the-art Earth Observation Activities in the regions of North Africa, Middle East, and Balkans and Developing Links with GEO related initiatives towards GEOSS



### Deliverable D7.4: IPR issues (II)

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## Executive Summary

This document (D7.4) presents the IPR considerations associated with the key exploitable assets of the GEO-CRADLE project, as it reaches its contractual end and in view of its continuation as a GEO Initiative (relevant decision adopted in the GEO Plenary held in Kyoto, Japan in October 2018). The considerations presented herein follow on the methodology laid out in deliverable 7.2.

It should be recalled that GEO-CRADLE is a Coordination and Support Action, and as such was not focussed on the development of new technologies or models. Nonetheless, the project gave rise to a number of “key exploitable assets” that involve IP and knowledge management issues as they shall continue to be sustained beyond the project’s contractual lifetime. This includes the outputs of the 4 feasibility studies (pilots), the EO Maturity Indicators methodology, the Regional Data Hub and the GEO-CRADLE Networking Platform.

Thus, this deliverable presents for each of these assets an analysis of related IP issues. This is in line with the provisions made in the Grant Agreement (GA) and the Consortium Agreement (CA).



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## Introduction

This document D7.4 is the final issue of the Intellectual Property Rights (IPR) Issues Report of the GEO-CRADLE project. This report discusses the main IP and knowledge management considerations associated with the key exploitable assets of the GEO-CRADLE project.

Taking all this into account, this report builds on the structure of the first version (deliverable 7.2) and adds greater detail on those assets that bear the greatest exploitation potential and as such entail IP considerations. The structure of the document is as below:

**Chapter 2** presents the context in which GEO-CRADLE operates.

**Chapter 3** provides a table of relevant definitions.

**Chapter 4** provides an overview of the legal basis for the management of IPR in GEO-CRADLE.

**Chapter 5** presents the methodology that was followed in the management of IPR in GEO-CRADLE.

**Chapter 6** presents each of the key exploitable assets of the project and the associated IP considerations.

**Chapter 7** provides conclusions and perspectives for the next steps.

# 1 Context

GEO-CRADLE brings together key players fully representing the Region of Interest (Balkans, N. Africa and M. East) and the complete EO value chain therein, with the **overarching objective of establishing a multi-regional coordination network** that will:

- i. Support the **effective integration of existing EO capacities** (space/air-borne/in-situ monitoring networks, modelling and data exploitation skills, and past project experience),
- ii. Provide the interface for the **engagement of the complete ecosystem of EO stakeholders** (scientists, service/data providers, end-users, governmental organisations, and decision makers),
- iii. Promote the **concrete uptake of EO services and data in response to regional needs**, relevant to four thematic priorities: adaptation to climate change, improved food security, access to raw materials and energy
- iv. Contribute to the **improved implementation of and participation in GEO, GEOSS, and Copernicus in the region.**

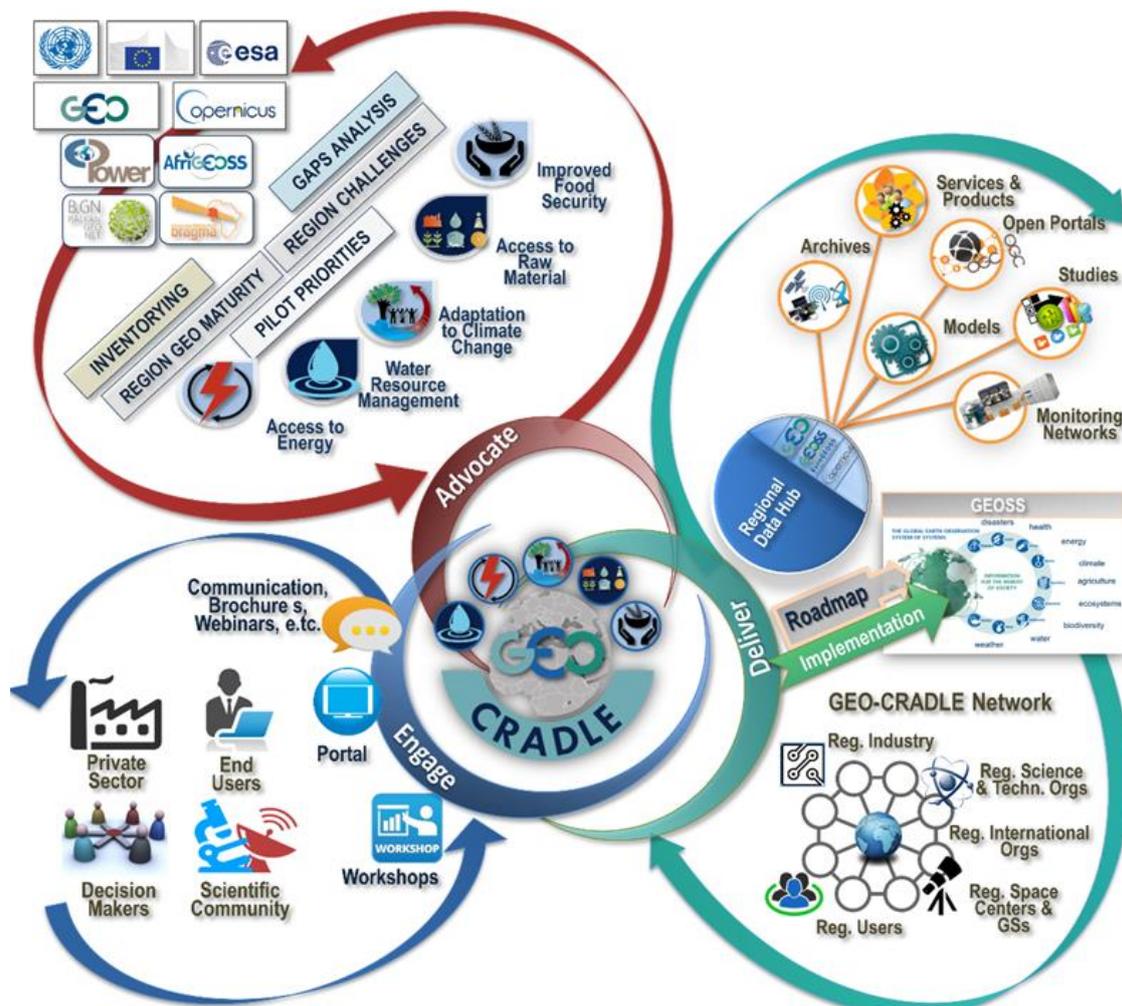


Figure 1: The GEO-CRADLE ecosystem

In this context, GEO-CRADLE has started by inventorying the regional EO capacities and user needs, through **targeted interviews with key actors in the region and through the dissemination of dedicated surveys**. The findings of these activities have been combined within a gap analysis that in turn enabled the definition of region specific **(G)EO Maturity Indicators** and **common priority needs**.

This was **followed by four feasibility studies**, demonstrating how the regional priorities can be tackled by the GEO-CRADLE Network. In parallel, GEO-CRADLE has set up a **Regional Data Hub**, which abides by the GEOSS Data Sharing Principles and facilitates access to and dissemination of region-related data.

Finally, the project has elaborated a roadmap for the future implementation of GEOSS and Copernicus in the region, with the ultimate aim to enable sustainable exploitation of the regional infrastructures and capacities as well as informed decision-making.

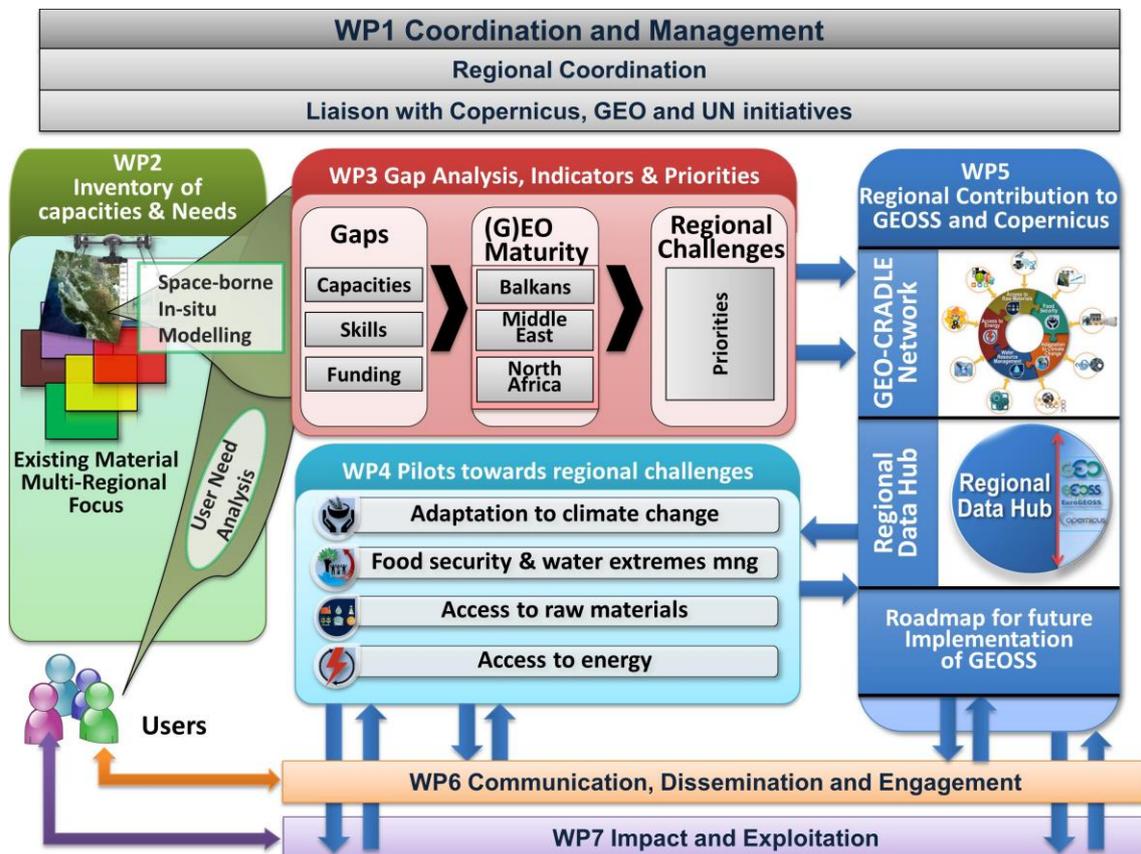


Figure 2: The GEO-CRADLE work breakdown structure

More information can be found online at <http://www.geocradle.eu/>



## 2 Definitions

The following definitions are adopted in this deliverable, as per those found in the Regulation on participation rules for Horizon 2020 (European Commission, 2013):

Term	Definition
<b>Access rights</b>	Rights to use results or background under the terms and conditions laid down in accordance with Regulation 1290/2013.
<b>Background</b>	Any data, know-how or information whatever its form or nature, tangible or intangible, including any rights such as intellectual property rights, which is: (i) held by participants prior to their accession to the action; (ii) needed for carrying out the action or for exploiting the results of the action; and (iii) identified by the participants according to Regulation 1290/2013, Article 45.
<b>Sideground<sup>1</sup></b>	Data, knowledge and information which are outside of the objectives of an action and which are not needed for implementing and exploiting the action.
<b>Results</b>	Any tangible or intangible output of the action, such as data, knowledge or information, that is generated in the action, whatever its form or nature, whether or not it can be protected, as well as any rights attached to it, including intellectual property rights.
<b>Dissemination</b>	Public disclosure of the results by any appropriate means (other than resulting from protecting or exploiting the results), including by scientific publications in any medium.
<b>Exploitation</b>	The use of results in further research activities other than those covered by the action concerned, or in developing, creating and marketing a product or process, or in creating and providing a service, or in standardisation activities.

*Table 1: Key Definitions*

<sup>1</sup> Although this term is not officially defined in Article 2 of Regulation 1290/2013, it used in Article 3(c)(iii)) and the definition supplied therein is repeated here.



### 3 Legal Basis

This section outlines the sources of applicable documentation serving as the legal basis for the management of IPR in the GEO-CRADLE project. Rules on intellectual property rights are indicated in the following background sources:

- The **Horizon 2020 Rules for Participation**, which are applicable to all funding programmes carried out under Horizon 2020;
- The applicable **work programme**, which in the case of GEO-CRADLE is the **Horizon 2020 Work Programme 2014–2015**;
- The **Grant Agreement** signed between the beneficiaries and the European funding body;
- The **Consortium Agreement** signed by the beneficiaries;
- Any other bilateral or multilateral agreements signed between the beneficiaries, which is not the case for GEO-CRADLE at the time of writing.

#### 3.1 Horizon 2020 Participation Rules

The Horizon 2020 rules for participation are laid down in *Regulation (EU) No 1290/2013 of the European Parliament and of the Council of 11 December 2013 laying down the rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)" and repealing Regulation (EC) No 1906/2006* (referenced as European Commission, 2013). The rules are described in Title III, "Rules Governing the Exploitation and Dissemination of Results, Chapter I "Grants".

Article	Subject
41	Ownership of results
42	Protection of results
43	Exploitation and dissemination of results
44	Transfer and licensing of results
45	Background
46	Access rights principles
47	Access rights for implementation
48	Access rights for exploitation
49	Access rights for the Union and the Member States

Table 2: Relevant articles in Regulation 1290/2013

#### 3.2 Work programme

The work programme "12. Climate action, environment, resource efficiency and raw materials" and more specifically the call "SC5-18b: Integrating North African, Middle East and Balkan Earth Observation capacities in GEOSS" against which the GEO-CRADLE project was funded does not contain any specific provisions related to IPR management.



### 3.3 Grant Agreement

Provisions on IPR management in the GEO-CRADLE Grant Agreement are found in the following Articles:

- **Article 23a**, which lays out the obligations in relation to management of intellectual property;
- **Article 24.1**, which specifies the agreement on background (between the beneficiaries);
- **Article 25.1**, which describes the provisions for access rights to background and how they shall be exercised, waived and not sub-licensed
- **Article 25.2**, provides the basis for beneficiaries to give each other access rights (on a royalty-free basis) for the implementation of the action
- **Article 25.3**, according to which beneficiaries have to grant access rights to their results to other beneficiaries when they need such access rights to implement the project and/or to exploit their own results.
- **Article 25.4**, which describes how the access rights for affiliated entities is following the same principles as for consortium members unless otherwise specified.
- **Article 26.1**, according to which the results are owned by the beneficiary that generate them, whereas
- **Article 26.2**, which foresees a default regime applicable to situations of joint ownership;
- **Article 26.3**, specifies that if third parties (including personnel) may claim rights to the results, the beneficiary concerned must ensure that it complies with its obligations under the Agreement.
- **Article 26.4**, clarifies the provisions related to the protection of results through Agency ownership
- **Article 27**, which deals with the protection of results by each beneficiary;
- **Article 28**, which specifies the beneficiaries' obligations vis-à-vis the exploitation of results<sup>2</sup>
- **Article 29**, which foresees the dissemination of results and open access to scientific publications and research data;
- **Article 30**, which addresses the transfer and licensing of results;
- **Article 31**, which describes the access rights to results for the beneficiaries and third parties.

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<sup>2</sup> See relevant section in "Definitions"



### **3.4 Consortium Agreement**

The GEO-CRADLE Consortium Agreement defines the basis for IPR management of both background and results in Section 8 “Results” and Section 9 “Access Rights”. Attachment 1 to this document specifies the background of the GEO-CRADLE project, in which beneficiaries identify and agree on the project background (as defined in Table 1) and specify any limitations or conditions for implementation of exploitation.

## 4 Methodology

The GEO-CRADLE Intellectual Property Rights methodology is comprised of the following activities:

1. **Identification:** Enumerating the IP (background and results) and determining ownership;
2. **Protection:** Evaluating the options for the protection of the IP; selecting and executing appropriate IP protection measures (taking into account the strategy outlined in the Sustainability Plan - D7.6);
3. **Management:** Implementation of day-to-day management processes, roles and procedures.
4. **Exploitation:** IP perspectives connected to the exploitation of key assets following the contractual end of the project and in view of its continuation as a GEO Initiative.

This methodology is complemented by considerations presented in D7.1 “Data Management Plan”, which has already been delivered. This specifies the aspects relevant to Data Management (in relation to the data gathered and/or generated throughout the various activities of the project); these considerations are thus not part of the IPR issues discussed here.

As mentioned above the overall methodology was introduced in D7.2 – see figure 1 below.



Figure 3: Methodology for IP originally considered in GEO-CRADLE

However, given the project’s nature as a CSA, some of these steps turned out not to be applicable. This is reflected in the revised figure below.

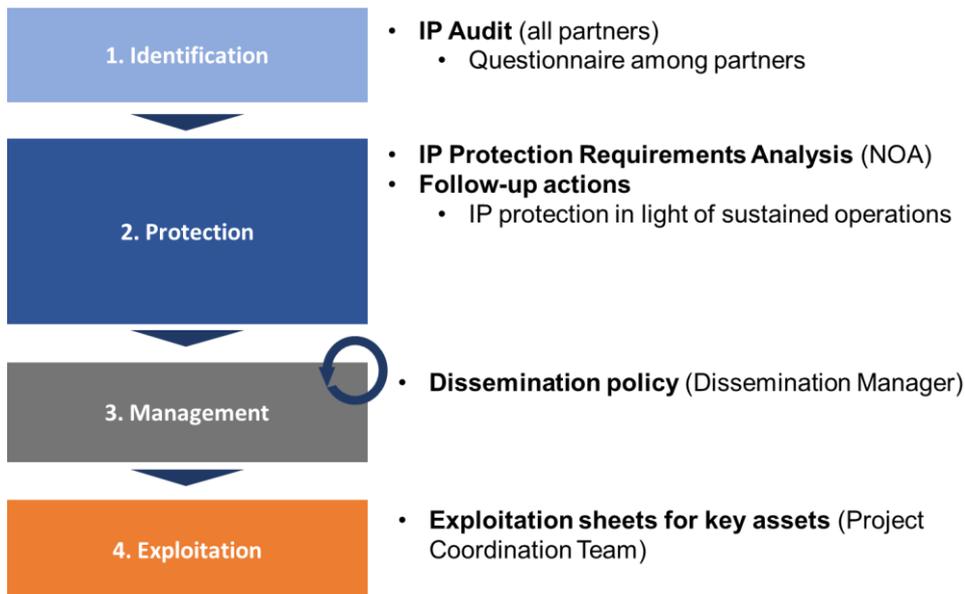


Figure 4: Final methodology adopted for IP in GEO-CRADLE

## 4.1 Identification

It is essential to compile a complete list of both the **background** and the expected **results** of the project in order to properly manage intellectual property rights, both during the project and in preparation of the exploitation of its results.

Project **background** has been identified in the context of the signature of the GEO-CRADLE Consortium Agreement. Partners retained the right to propose new elements of background. Would this have been the case, the proposals would have to be submitted to the General Assembly for review, as per Section 9.1.2 of the Consortium Agreement. An up-to-date list of the background indicated in the Consortium Agreement is supplied in Annex I of this document. **This list has not been expanded during the implementation of the project and as such remains intact** when compared to deliverable 7.2.

Further to this, a comprehensive list of the intellectual property (“results”) generated **during** the GEO-CRADLE project had to be compiled, with a direct view on the sustained operations of the project (or its components) beyond its lifetime. This is done within this report in Chapter 6.

The identification of entries for both cases was facilitated through the execution of an **IP Audit**. This was undertaken in the form of a relevant field within the individual exploitation plans template shared with all partners. Thus, partners were asked to provide considerations related to IP (if applicable) around the key exploitable assets that they wish to be involved with during or beyond the project (see below).



**Individual Exploitation Plan**

Please describe briefly the current situation and the change you expect as a result of the project. Please make sure you fill in the yellow parts and the cells cont

<b>PARTNER</b>	Organisation Name	e.g. NOA	
	Organisation Type	e.g. Research Institute, SME, etc.	
	Country	e.g. Greece	
Main role in GEOCRADLE	Describe your role in the project (leader of Task XX, Contributor to Tasks XX and YY, etc.)		
Ambition for GEOCRADLE	Describe how you expect GEOCRADLE to contribute to your activities, help you build capacity, expand your business, etc.		
<b>IMPACT</b>	<b>Current</b>		<b>Delta after GEO-CRADLE</b>
	Business or thematic sectors	In which business or science sectors are you active? e.g. modelling in agriculture, emergency management, water quality...	Impact of GEO-CRADLE in your activities in these sectors or the expansion of your activities in new sectors
Customer/User profile	Who are you helping with your work? Service Providers, Research Institutes, Public Institutions (e.g. EEA, EC)		Impact of GEO-CRADLE in reaching out to more users or new users
Products and services (incl. their websites if available)	This includes both services such as e.g. solar irradiation nowcasting AND services like capacity building in EO...		Impact of GEO-CRADLE in the development of your services
<b>USERS</b>	<b>Currently engaged and/or benefited</b>		<b>Potentially to be engaged and/or benefit in the future</b>
	List of users (incl. their websites if available)	1. 2. 3.	1. 2. 3.
Specific feedback / Comments	If applicable, please describe specific feedback on GEO-CRADLE (good or bad) received by users you have been in contact with.		
<b>EXPLOITATION</b>	<b>GEO-CRADLE activities currently exploited</b>		<b>GEO-CRADLE activities to be exploited in the future</b>
	Which GEO-CRADLE components do you (plan to) exploit?	1. 2. 3.	1. 2. 3.
Concrete examples of exploitation (incl. at national level)	List examples of how you exploit GEO-CRADLE and its individual activities		
Specific IP considerations associated with identified activities	Provide considerations associated with specific exploitable assets if applicable		
<b>FUNDING</b>	<b>Funding schemes targeted</b>		
	List of funding schemes targeted (at national or international level)	1. 2. 3.	
Ideas and Recommendations for Exploitation	Share any ideas or recommendations you have for the exploitation strategy of GEO-CRADLE		
Reporting	Describe how outcomes will be documented and shared (inform, planning and document results)		
Time Frame	Enter the period of time over which you wish to implement the sustainability activities		

Figure 5: Screenshot of the individual exploitation plans template with entries for IP

At M33 of the project, just before the end of its activities, partners involved in the exploitation of key assets have been asked to further fill in a dedicated template as shown below.

<b>"KEY ASSET"</b>		
<b>Short Description:(short description of the pilot, why is it exploitable and sustainable)</b>		
KEY ASSET is.... Its exploitation value is associated with...		
<b>Governance (who were involved in the implementation of the pilot and how)</b>		
<b>Actors Involved</b>	<b>Organisation</b>	<b>Role</b>
Organisations involved in providing/delivering the solution	Organisation A	e.g. Provider of XYZ data
	Organisation B	e.g. Provider of technical platform
	Organisation C	e.g. Consultant
Partnerships	Please provide information on foreseen partnership scheme required to sustain the operation of the asset	



IP considerations (in which IP category the pilot fits?)			
IP exploitation schemes	Scheme	Foreground exploitation considerations	Comments (if any)
	Example 1: Licensing agreement		▪
	Example 2: Scientific exploitation/ publications		▪ e.g. Open and Free
	Example 3: Sustained through follow-up R&D		▪
	Example 4: Commercial sales...		▪
Funding opportunities for further R&D (past-ongoing and future plans for funding, if any)			
Procurement/Funding scheme			
Horizon 2020 (EO1, SME instrument, etc.) and other European programmes (e.g. PRIMA)	Name of call(s)		
	Relevant Target Users	Please list which of the above target users you believe could fund this service through call for tenders	
	Indicative timeframe	Please provide a rough estimation of the relevant timeframe	
	Comments	Please provide any additional comments	
National projects	Name of call(s)		
	Relevant Target Users	Please list which of the above target users you believe could fund this service through call for tenders	
	Indicative timeframe	Please provide a rough estimation of the relevant timeframe	
	Comments	Please provide any additional comments	
Other funding	Name of call(s)		
	Relevant Target Users	Please list which of the above target users you believe could fund this service through call for tenders	
	Indicative timeframe	Please provide a rough estimation of the relevant timeframe	
	Comments	Please provide any additional comments	

Figure 6: Dedicated template of Key assets

The combination of these two templates provides a structured way of compiling, and then validating the set of IP assets relevant to the (potential) exploitation of GEO-CRADLE's results.



## 4.2 Protection

Beneficiaries are required to examine the possibility of protecting their results and must do so, for an appropriate period and with appropriate territorial coverage if the following conditions are met (UKRO, 2014):

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

When deciding on protection, the beneficiary must consider its own interests and the interests (especially commercial) of the other beneficiaries.

Given this requirement, an assessment of the extent to which certain assets require legal IP protection was carried out on the basis of the initial IP audit (**IP Protection Requirements Analysis**). The assets were **evaluated** on the basis of their subject matter (e.g. software, design, website, etc.) and **classified** according to their significance for the sustainable exploitation (and potentially commercialisation) of the GEO-CRADLE results.

The different outputs of GEO-CRADLE that entailed potential “foreground IP” with expected exploitation perspectives, were evaluated and classified on the basis of a custom-built IP Protection Requirements Analysis tool, which is effectively a database of key characteristics defining each IP asset, such as its type, whether it is already protected, who the current/future owner is or will be, and how critical it is for the core mission of GEO-CRADLE (as it will be further sustained). In principle, this tool can also capture information related to the assets’ market value and production cost, its replicability in the open market, and other factors influencing the decision on whether to protect the asset, and if so, how. This however, has not been further assessed given (i) the nature of GEO-CRADLE as a CSA, and (ii) the exploitation modalities of its key components which do not have a commercialisation orientation *per se*.

The resulting classification will categorise each asset as either “unlikely”, “likely”, or “highly likely” to require protection. The following is an excerpt from the IP Protection Requirements Analysis tool that was used for this purpose. The actual table is presented at the end of Chapter 6.



Asset Id	Type of Asset	Existing Protection	Description of protection	Mission-criticality	Replicability	Production cost	Market value	...
#	Invention	YES   NO	Patent	HIGH	HIGH	[VALUE]	[VALUE]	...
	Software		Utility Model					
	Article		Industrial Design					
	Design		Copyright	MEDIUM	MEDIUM			
	Name		Trade Mark	LOW	LOW			
	Know-how		Confidential Information					
	Website							

Figure 7: IP Protection Requirements Analysis tool (excerpt)

Once the assets were classified using the tool, the Task Leader (T7.2) together with NOA could lay out a proposal on whether and how to protect each IP asset. Examples of potential protection for different kinds of assets are shown in the table below. These have been – in principle – considered for GEO-CRADLE, but as can be readily seen their applicability to the actual outputs of the project was limited.

Asset	Patent	Utility Model	Industrial Design	Copyright	Trade Mark	Confidential Information
Invention (e.g. device, process, method)	x	x				x
Software	x	x		x		x
Scientific article				x		
Design of a product			x	x	x	
Name of a technology/product					x	
Know-how						x
Website			x	x	x	x

Table 3: Protection options for IP assets



### 4.3 Management

In complement to the two-stage IP assets audit, procedures for day-to-day management of IPR generated throughout the course of the project have been considered. In practice, two types of policies were considered in the context of GEO-CRADLE:

- **Dissemination policy:** A consortium-wide policy on the dissemination of scientific results, including provisions on confidentiality for those elements deemed mission-critical to GEO-CRADLE.
- **Overall IPR policy** covering a consortium-wide approach.

Given the CSA nature of the project, the latter was deemed unnecessary, especially in view of the fact that IP is clearly covered in the Consortium Agreement and further extended in the series (version I and II) of IPR issues deliverables.

#### 4.3.1 Ownership of jointly-produced IP

The GEO-CRADLE consortium agreement contains the following provisions on jointly-produced IPR:

- each of the joint owners shall be entitled to use their jointly owned Results for non-commercial research activities on a royalty-free basis, and without requiring the prior consent of the other joint owner(s), and
- each of the joint owners shall be entitled to otherwise Exploit the jointly owned Results and to grant non-exclusive licenses to third parties (without any right to sub-license), if the other joint owners are given: (a) at least 45 calendar days advance notice; and (b) Fair and Reasonable compensation.

**The joint owners shall agree on all protection measures and the division of related cost in advance.**

It is not, however, specified on what basis the agreement on joint ownership should be drafted, how proportional contributions to the production of specific IP should be evaluated, and what mediation measures should be taken in the event of conflicts or disagreements. Furthermore, the requirement to agree on “all protection measures and the division of the related cost in advance” does not specify the event or milestone of which such agreement occurs “in advance” (production of asset, protection of asset, etc.).

**It is necessary that these issues are addressed in an agreement on joint ownership**, as per the above clause. The joint ownership agreement should address the following issues (based on European IPR HelpDesk, n.d.):



- **Parties:** identification of the participants - joint owners;
- **Object of the contract:** the joint ownership of the project results (results);
- **Shares:** assignment of shares within the joint ownership;
  - Shares split equally among all joint owners or
  - Shares split in proportion to the joint owners' contributions;
- **IP management:** indication of the partner responsible for filing and maintaining (including the costs incurred) of the IP rights over the results;
- **Protection of rights:** obligation imposed on all participants to monitor and report any infringements of the results; indication of the partner empowered to conduct legal actions for protection of the results;
- **Conditions** of the use of the results;
- **Use in further research:** conditions for use of the results for further research carried out with third parties, i.e. joint owners may be required to inform each other of such plans and sign respective confidentiality agreements with the third parties;
- **Individual exploitation:** conditions for exploitation of the common results individually in participant's own commercial activities;
- **Licensing:** possibilities to license (sublicense) the common results. This possibility may be totally restricted (i.e. licensing upon agreement of all joint owners) or subject to certain conditions;
- **Transfer:** Determining whether and under what conditions a joint owner may transfer its share to third parties. The rest of the joint owners may reserve the right to be informed of any such plans and/or be given a right to object such transfer;
- **Dispute resolution:** Processes governing the resolution of disputes;
- **Additional clauses:** standard contractual matters, i.e. applicable law, jurisdiction, etc.

It may be necessary to adapt the joint ownership agreement (and/or sign additional, asset-specific agreements) **after** jointly-owned results are produced, in particular with regard to:

- The **assignment of ownership** for the particular asset;
- The **means and protection** of the asset, including issues related to the cost of protection (e.g. patent filing and examination fees, renewal fees, prior state-of-the-art searches, infringement actions, etc.),
- The **sharing of revenues or profits**;
- **Modes of exploitation** of the joint results.



## 5 IPR considerations for key exploitable assets

### 5.1 Regional Data Hub

<b>“Regional Data Hub”</b>			
<p><b>Short Description:</b> The GEO-CRADLE Regional Data Hub (<a href="http://datahub.geocradle.eu/">http://datahub.geocradle.eu/</a>) provides access to both region-related datasets, portals and services developed by a regional network of raw data providers, intermediate users/service providers, end-users from Industry, Academic and Public Sector from the Region of Interest (including the outputs from the GEO-CRADLE pilots), and, also, datasets and services directly fed from the GEOSS-portal. Moreover, being the centralised gateway for regional data providers to contribute easily and timely their products to GEOSS, the Regional Data Hub is the focal node in the region in the context of GEOSS and Copernicus implementation. The GCRDH facilitates the access to downloadable files of Space-borne data from real-time EO satellite missions’ acquisitions; data from Airborne campaigns performed in the region; In-situ data; and Models such as Atmospheric and Climate. Together with the GEO-CRADLE Regional Networking Platform, it is the cornerstone for promoting better sharing of information and knowledge amongst EO stakeholders in the region.</p>			
<b>Governance</b>			
<b>Actors Involved</b>	<b>Organisation</b>	<b>Role</b>	
Organisations involved in providing/delivering the solution	NOA	<i>Designer and provider of technical platform</i>	
	GEO Secretariat	<i>Collaboration for the connection and interoperability with the GEOSS-portal</i>	
Partnerships	<i>Regionally-applicable GEO Flagships and Initiatives (e.g. AfriGEOSS, EuroGEOSS); other data holders at national level</i>		
<b>IP considerations</b>			
<b>IP exploitation schemes</b>	<b>Scheme</b>	<b>Foreground exploitation considerations</b>	<b>Comments (if any)</b>
	Sustained and expanded through follow-up R&D	It will be further exploited and enriched in the framework of the GEO-CRADLE Initiative	<ul style="list-style-type: none"> <li>Free and open access (<a href="http://datahub.geocradle.eu/">http://datahub.geocradle.eu/</a>)</li> </ul>
<b>Funding opportunities for further R&amp;D</b>			
<b>Procurement/Funding scheme</b>			
Horizon 2020	Name of call(s)	<a href="#">SC5-15-2018</a> (EuroGEOSS)	
	Relevant Target Users	EU Member States and neighbouring countries	
	Indicative timeframe	2019-2022	
	Comments	Follow-up and expansion	
Copernicus FPA / SGA actions	Name of call(s)	Caroline Herschel	
	Relevant Target Users	EU Member States	
	Indicative timeframe	2019-2022	
	Comments	Capacity building in BAMENA and Black Sea	

Figure 8: Key asset - Regional Data Hub



## 5.2 EO Maturity Indicators Methodology

"Maturity Indicators"			
<p><b>Short Description:</b> GEO-CRADLE has established the novel "EO Maturity Indicators" methodology as an analytical tool that allows the quantitative measurement of the current EO capabilities in a given country and their evolution over time. This approach was tested over a period of 15 months, through the mobilisation of the GEO-CRADLE country partners, covering 11 countries from the Balkans, Middle East and North Africa. After analysing the collected data, we developed a standardised visualisation in the form of a "maturity card". The results of the implementation of the methodology are highly appreciated by the GEO Secretariat and the country representatives. The maturity cards have proven to be a powerful tool to highlight strengths and weaknesses, communicate on identified gaps, understand the level of uptake of key initiatives such as Copernicus and GEO, and guide future EO activities. There is therefore strong interest to improve, expand and replicate the methodology in upcoming activities.</p>			
<b>Governance</b>			
<b>Actors Involved</b>	<b>Organisation</b>	<b>Role</b>	
Organisations involved in providing/delivering the solution	EARSC	<i>Implementation of the methodology (and practical improvements therein) and execution of data analysis for all the data collected.</i>	
	NOA/Evenflow	<i>Design and development of the methodology; implementation of upgrades going forward</i>	
	GEO-CRADLE country partners	<i>Collection of data against the different indicators at country level</i>	
Partnerships	<i>AfriGEOSS, EuroGEOSS, GEO Secretariat. In all cases, towards improvement of methodology and implementation in countries outside of GEO-CRADLE RoI</i>		
<b>IP considerations</b>			
<b>IP exploitation schemes</b>	<b>Scheme</b>	<b>Foreground exploitation considerations</b>	<b>Comments (if any)</b>
	Scientific exploitation/publications	The methodology has been originally developed within GEO-CRADLE. Improvements have been proposed and shall be developed in subsequent R&D activities.	As a minimum, all publications will be available via Green Open Access, e.g. through OpenAIRE, ResearchGate and repositories supported by individual institutions
<b>Funding opportunities for further R&amp;D</b>			
<b>Procurement/Funding scheme</b>			
Horizon 2020	Name of call(s)	<a href="#">SC5-15-2018</a>	
	Relevant Target Users	Expansion of the application of the methodology in EU countries	
	Indicative timeframe	2019-2022	
	Comments	The methodology will be implemented across European countries represented within the project and will be also expanded to include indicators related to the progress of EO integration in SDG reporting	
Copernicus FPA / CopHub.AC	Name of call(s)	NA	
	Relevant Target Users	EU Member States	
	Indicative timeframe	2019-2022	



	Comments	GEO-CRADLE partners will pursue to mobilise local actors (within FPA) and the Copernicus Academies/Relays networks (through their involvement in CopHub.AC) for the collection of country-level data.
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Figure 9: Key asset- Maturity Indicators

### 5.3 Pilot outputs

#### 5.3.1 Adaptation to Climate Change

“Adaptation to Climate Change - ACC”			
<p><b>Short Description:</b> The RoI has been recognised by the Intergovernmental Panel on Climate Change as one of the most sensitive and vulnerable to climate change regions on Earth. Climate change is governed to a large extent by atmospheric processes, in particular, the interaction between radiation and atmospheric components (e.g. aerosols, clouds, greenhouse, and trace gases), some of which also contributing significantly to air quality degradation. In summary, the ACC pilot will: (a) support the sustainability of regional EO infrastructures and trigger needed synergies, (b) improve knowledge on current regional climate adaptation policies, and (c) provide reliable assessments on the level of needed coordination and future investment to be carried towards the implementation of GEO, GEOSS and Copernicus in the RoI. The climate services <b>DEAR-Clima</b> and <b>ACC-DUST</b> were developed in this pilot.</p>			
Governance			
Actors Involved	Organisation	Role	
Organisations involved in providing/delivering the solution	NOA (Stavros Solomos, Vassilis Amiridis)	<i>Principal investigator and developing of ACC-DUST</i>	
	AUTH (Athanasios Tsikerdekis, Dimitris Akritidis, Prodromos Zanis)	<i>Principal investigator and developing of DEAR-Clima</i>	
Partnerships	<i>GEO-CRADLE Access to Energy (SENSE) pilot service</i>		
IP considerations			
IP exploitation schemes	Scheme	Foreground exploitation considerations	Comments (if any)
	<i>Scientific exploitation</i>	Publications, impact of mineral dust and atmospheric parameters on climate change considerations	▪ Open access
	<i>Sustained through follow-up R&amp;D</i>	Submission of various scientific and technological project proposals	▪ Collaborations
	<i>Commercial sales</i>	Support decision making on climate change adaptation projects related to environment, tourism, fishery, agriculture, and energy sectors	▪ Collaborations
Funding opportunities for further R&D			
Procurement/Funding scheme			
Horizon 2020 (EO1, SME)	Name of call(s)	<i>EuroGeoss</i>	
	Relevant	<i>Energy Investors, city resilience, sustainable development</i>	



instrument, etc.) and other European programmes (e.g. PRIMA)	Target Users	
	Indicative timeframe	4 years (2019-2022)
	Comments	N/A

Figure 10: Key asset - Adaptation to Climate Change Pilot

### 5.3.2 Improved food security – water extremes management

“Improved Food Security”			
<p><b>Short Description:</b> The Improved food security pilot was introduced by i-BEC (Greece) and TAU (Israel). The goal was to build a regional soil spectral library (SSL) that includes the chemical, physical and spectral attributes of each soil sample. The subject of how to build and manage SSLs was introduced to the other partners during both frontal and online workshops. In addition, statistical models were developed for assessing selected soil properties using the spectral information. Its exploitation value is associated with the establishment of a regional soil spectral library using the same protocol for a more precise soil monitoring and toward the implementation of GEO, GEOSS and Copernicus activities for food security and sustainable agriculture.</p>			
<b>Governance</b>			
<b>Actors Involved</b>	<b>Organisation</b>	<b>Role</b>	
Organisations involved in providing/ delivering the solution	Interbalkan Environment Balkan, CIMA	Technical capacity and implementation, scientific guidance, expertise on the development of Libraries, data providers	
	National Observatory of Athens	Provider of Regional Hub	
	Tel Aviv University	Expertise in standardized methodology	
Partnerships	Partnership schemes with JRC, CSIRO, China Academy of Sciences, EO4SDs		
<b>IP considerations</b>			
<b>IP exploitation schemes</b>	<b>Scheme</b>	<b>Foreground exploitation considerations</b>	<b>Comments (if any)</b>
	Example 2: Scientific exploitation/ publications	<p>N. L. Tsakiridis, J. B. Theocharis and G. C. Zalidis, "An evolutionary fuzzy rule-based system applied to real-world Big Data - the GEO-CRADLE and LUCAS soil spectral libraries," 2018 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE), Rio de Janeiro, 2018, pp. 1-8. doi: 10.1109/FUZZ-IEEE.2018.8491489</p> <p>Nikolaos Tziolas, Nikolaos Tsakiridis, Eyal Ben-Dor, Eleni Kalopesa, George Galanis, George Zalidis,</p>	Open and Free



		<p>"Novel In Situ System for Monitoring Soil Organic Carbon by Using Mobile Vis-NIR Spectroscopy and Machine Learning Techniques", European Agriculture Engineering Conference (EurAgEng 2018), Wageningen, the Netherlands, 8-12 July 2018.</p> <p>N. L. Tsakiridis, N. V. Tziolas, J. B. Theocharis and G. C. Zalidis, "A GA-based stacking algorithm for predicting Soil Organic Matter from vis-NIR spectral data", European Journal of Soil Science, Accepted for publication</p> <p>UNDER REVIEW N. V. Tziolas, N. L. Tsakiridis, G. C. Zalidis, J. B. Theocharis and E. Ben-Dor, "A modified local regression approach applied to predict soil properties in a combined soil spectral library from Balkan, North Africa and Middle East region", Geoderma, under review.</p>	
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**Funding opportunities for further R&D**

**Procurement/Funding scheme**

National projects	Name of call(s)	<i>National Spectral Library of Israel</i>
	Relevant Target Users	<i>Scientists, farmers, remote sensing companies</i>
	Indicative timeframe	<i>3 years 2016-2019</i>
	Comments	<i>Involved with many scientists who contribute to the project daily with soil samples</i>
Other funding	Name of call(s)	<i>ISF – NSCF</i>
	Relevant Target Users	<i>Chinese farmers, scientists</i>



	Indicative timeframe	2019-2022
	Comments	<i>This proposal was submitted and under review</i>

Figure 11: Key asset - Improved Food Security Pilot

### 5.3.3 Access to raw materials

<b>“Access to Raw Materials”</b>		
<p><b>Short Description:</b> Through close cooperation with end-users in RoI, EuroGeoSurveys defined four different examples of pilot sites for which feasibility studies were elaborated, including EO methods, for the better monitoring of the mining and post-mining areas and mitigation of their impact. We succeeded in elaborating the EO methodologies for monitoring of quarrying activities in Greece, improved monitoring in abandoned Asbestos mine in Cyprus, carbon potential investigation and determination of orientation of coal outcrops in Central Anatolian Lignite Basin in Turkey and determination of the iron potential zones in Celebi Iron-oxide mineralization district in Turkey. Their exploitable value is associated with the elaboration in the future of these feasibility studies, leading to the long-term collaboration between Geological Surveys of Europe and the government and research parties in the countries of RoI.</p>		
<b>Governance</b>		
<b>Actors Involved</b>	<b>Organisation</b>	<b>Role</b>
Access to raw materials - monitoring of quarrying activities		
Organisations involved in providing/delivering the solution	Greek Ministry of Environment & Energy	<i>Provider of the locations under interest (GIS format). Validation of results – Final User</i>
	Institute of Geology and Mineral Exploration (IGME), the Greek Geological Survey	<i>Provider of geological data Elaboration of the feasibility study. Establishment of the methodology for the monitoring of illegal quarrying at country level</i>
Partnerships	<i>Partnership between the two involved actors, the Greek Ministry of Environment &amp; Energy and the Institute of Geology and Mineral Exploration (IGME), the Greek Geological Survey</i>	
Access to raw materials - monitoring in abandoned Asbestos mine in Cyprus		
Organisations involved in providing/delivering the solution	Geological Survey of Cyprus (Cyprus)	<i>Provider of geological data. Final user, Validation of data</i>
	PGI, the Geological Survey of Poland	<i>Elaboration of the feasibility study. Application of satellite interferometry method.</i>
	Institute of Geology and Mineral Exploration (IGME), the Greek Geological Survey	<i>Elaboration of the feasibility study. Image processing and vector GIS techniques</i>
Partnerships	<i>Partnership between the three Geological Surveys of Cyprus, Poland and Greece.</i>	
Access to raw materials - investigation and determination of orientation of coal outcrops in Central Anatolian Lignite Basin in Turkey and determination of the iron potential zones in Celebi Iron-oxide mineralization district in Turkey		
Organisations involved in providing/delivering	Association of Geological Researches in Turkey (JADE)	<i>Provider of geological data. Final user, Validation of data</i>
	TÜBİTAK Space	<i>Final User</i>



the solution	Technologies Research Institute UZAY (Turkey)		
	PGI, the Geological Survey of Poland	<i>Elaboration of the feasibility study. Lineament analysis and Image processing.</i>	
	Institute of Geology and Mineral Exploration (IGME), the Greek Geological Survey	<i>Elaboration of the feasibility study. Image processing and vector GIS techniques</i>	
Partnerships	<i>Partnership between the two Geological Surveys of Poland and Greece with the two organisations in Turkey.</i>		
<b>IP considerations</b>			
IP exploitation schemes	<b>Scheme</b>	<b>Foreground exploitation considerations</b>	<b>Comments (if any)</b>
	<i>Scientific exploitation/publications</i>		▪ Open access
<b>Funding opportunities for further R&amp;D</b>			
<b>Procurement/Funding scheme</b>			
Horizon 2020 (EO1, SME instrument, etc.) and other European programmes (e.g. PRIMA)	Name of call(s)	<i>SC5-10-2019-2020 Raw materials innovation actions: exploration and Earth Observation in support of sustainable mining</i>	
	Relevant Target Users	<i>The Greek Ministry of Environment and Energy and the Cyprus Ministry of Agriculture, Rural Development and Environment could apply for funding</i>	
	Indicative timeframe	<i>2nd stage Deadline: 04 September 2019</i>	
	Comments		

Figure 12: Key asset - Access to Raw Materials Pilot

### 5.3.4 Access to renewable energy resources

<b>“Access to Renewable Energy Resources”</b>		
<b>Short Description:</b> The access to renewable energy resources pilot was introduced by the PMOD/WRC and the NOA and its scope was to coordinate, improve and support the regional EO infrastructures and capabilities related to solar energy exploitation and management. The niche for this pilot was an operational, satellite-driven and real-time system for solar energy nowcasting and forecasting, the so-called Solar Energy Nowcasting SystEm (SENSE). Its exploitation value is associated with the intention to be a starting point for energy related short future investments towards and beyond the implementation of GEO, GEOSS and Copernicus Energy activities and visioning innovative high-end applications and technologies.		
<b>Governance</b>		
<b>Actors Involved</b>	<b>Organisation</b>	<b>Role</b>
Organisations involved in providing/delivering the solution	PMOD/WRC (Stelios Kazadzis)	<i>Principal investigator of SENSE (provided the knowledge and guidance in order to implement such a state-of-the-art system)</i>
	NOA (Panagiotis Kosmopoulos)	<i>Developed the SENSE (exploited a combination of radiative transfer models, machine learning and real-time satellite data)</i>



<b>Partnerships</b>		<i>Ministry of Electricity and Renewable Energy of Egypt, Independent Power Transmission Operator of Greece, Attica Group</i>	
<b>IP considerations</b>			
<b>IP exploitation schemes</b>	<b>Scheme</b>	<b>Foreground exploitation considerations</b>	<b>Comments (if any)</b>
	<i>Scientific exploitation</i>	Publications, impact of atmospheric parameters on solar radiation and energy	<ul style="list-style-type: none"> <li>Open access</li> </ul>
	<i>Sustained through follow-up R&amp;D</i>	Submission of various scientific and technological project proposals.	<ul style="list-style-type: none"> <li>Collaborations</li> </ul>
	<i>Commercial sales</i>	Business plans for the establishment, operation and exploitation of solar farm projects. Support the transmission and distribution system operators.	<ul style="list-style-type: none"> <li>Energy, agriculture and health related services</li> </ul>
<b>Funding opportunities for further R&amp;D</b>			
<b>Procurement/Funding scheme</b>			
Horizon 2020 (EO1, SME instrument, etc.) and other European programmes (e.g. PRIMA)	Name of call(s)	<i>EuroGeoss</i>	
	Relevant Target Users	<i>Transmission and Distribution System Operators, Energy Investors, Solar farms managers, Smart grid software providers</i>	
	Indicative timeframe	<i>4 years (2019-2022)</i>	
	Comments	<i>In collaboration with MINES ParisTech and Transvalor from France</i>	
Other funding	Name of call(s)	<i>Development of a business plan for the establishment, operation and exploitation of a solar farm in Aswan, Egypt.</i>	
	Relevant Target Users	<i>The Magdi Yacoub Heart Hospital</i>	
	Indicative timeframe	<i>3 months (5-7/2017)</i>	
	Comments	<i>In collaboration with Evenflow SPRL. This project opened for SENSE the Egyptian energy market for further implementation.</i>	

Figure 13: Key asset - Access to Renewable Energy Resources Pilot

## 5.4 GEO-CRADLE Networking Platform

<b>“Networking Platform”</b>
<p><b>Short Description:</b> GEO-CRADLE has established an attractive, user-friendly and comprehensive regional Networking Platform (<a href="http://geocradle.eu/platform/">http://geocradle.eu/platform/</a>), which, for the first time in NAMEBA, makes available with open access an inventory of regional EO capacities with detailed profiles of the relevant stakeholders. It is an on-going activity, a live regional network of raw data providers, intermediate users/service providers, end-users from Industry, Academic and Public Sector across the NAMEBA region. Through this GEO-CRADLE Networking Platform regional stakeholders can be informed</p>



on existing capacities, complementary skills and collaboration opportunities. This is one of the fundamental requirements for coordinated EO activities promoting better sharing of information and knowledge and facilitating the cooperation amongst EO stakeholders in the Rol.			
<b>Governance</b>			
<b>Actors Involved</b>	<b>Organisation</b>	<b>Role</b>	
Organisations involved in providing/delivering the solution	NOA	<i>Designer and provider of technical platform</i>	
	CIMA, EGS, IPB, EURISY	<i>Provision of specific inputs (typically through the inventory of capacities and user needs)</i>	
Partnerships	<i>Regionally-applicable GEO Flagships and Initiatives (e.g. AfriGEOSS, EuroGEOSS)</i>		
<b>IP considerations</b>			
<b>IP exploitation schemes</b>	<b>Scheme</b>	<b>Foreground exploitation considerations</b>	<b>Comments (if any)</b>
	Sustained and expanded through follow-up R&D	It will be further exploited and enlarged in the framework of the GEO-CRADLE Initiative	<ul style="list-style-type: none"> <li>Free and open access (<a href="http://geocradle.eu/platform/">http://geocradle.eu/platform/</a>)</li> </ul>
<b>Funding opportunities for further R&amp;D</b>			
<b>Procurement/Funding scheme</b>			
Horizon 2020	Name of call(s)	<a href="#">SC5-15-2018</a> (EuroGEOSS)	
	Relevant Target Users	EU Member States and neighbouring countries	
	Indicative timeframe	2019-2022	
	Comments	Follow-up and expansion	
Copernicus FPA / SGA actions	Name of call(s)	Caroline Herschel	
	Relevant Target Users	EU Member States	
	Indicative timeframe	2019-2022	
	Comments	Capacity building in BAMENA and Black Sea	

Figure 14: Key asset - Networking Platform

## 5.5 Roadmap

<b>“Roadmap”</b>		
<b>Short Description:</b> GEO-CRADLE has developed a roadmap for the future implementation of GEO/GEOSS and Copernicus in the BAMENA region. The roadmap entails a number of recommended actions, with clear proposals on who should be involved, how the action should be carried out, in which timeframe and with what impact. The aim of the roadmap is to guide future programming and planning of relevant initiatives, eventually supporting the effective uptake of EO activities in the region.		
<b>Governance</b>		
<b>Actors Involved</b>	<b>Organisation</b>	<b>Role</b>
Organisations involved in providing/delivering the solution	NOA	<i>Key contributor to the development of the roadmap</i>
	CEDARE/IBEC	<i>Coordination of regional inputs</i>
	GEO-CRADLE partners	<i>Provision of specific inputs (typically through previous</i>



	<i>deliverables)</i>		
Partnerships	<i>DG RTD, DG GROW, GEO Secretariat, Regionally-applicable GEO Flagships and Initiatives</i>		
<b>IP considerations</b>			
IP exploitation schemes	<b>Scheme</b>	<b>Foreground exploitation considerations</b>	<b>Comments (if any)</b>
	Uptake within future work programmes	None	<ul style="list-style-type: none"> <li>▪ Open access of relevant deliverable</li> </ul>
<b>Funding opportunities for further R&amp;D</b>			
<b><i>Procurement/Funding scheme</i></b>			
Various upcoming R&D activities	<i>The roadmap aspires to inform the programming/planning of future activities in the region, including Horizon 2020 calls, GMES&amp;Africa projects, GEO Flagships, etc.</i>		

*Figure 15: Key asset - Roadmap*



## 6 Conclusions

This document has outlined the legal background on which the analysis of IPR issues is grounded, and described the methodology that was applied to the management of IPR for the GEO-CRADLE project. Identification, protection, management and exploitation activities are defined, which include the development of an IP asset inventory, an analysis of IP protection requirements, and the assessment of IP considerations for the key exploitable assets of the project.



# ANNEX I

## ***GEO-CRADLE project background***

The following table presents the project background of GEO-CRADLE as declared in the Consortium Agreement Version 1, December 2015.

<b>Partner</b>	<b>Background</b>	<b>Limitations for implementation</b>	<b>Limitations for exploitation</b>
<b>NOA and PMOD/WRC</b>	A system for the calculation of the now-casting solar energy. The system is based in online satellite data, used in a radiative transfer model and neural network model system. The product consist of a high temporal (15 min) and spatial (0.05 degrees) resolution nowcasting solar energy map.data.	n/a	n/a
<b>IBEC and TAU</b>	Know-how thus processing and elaborating soil spectral data with the respective soil spectral libraries in a geodatabase. Specialised equipment required are available, meaning spectroradiometers that cover the range of 350 to 2500 nm wavelengths	n/a	n/a
<b>CERT</b>	n/a	n/a	n/a
<b>TAU</b>	Soil spectral measurement in the laboratory and field. Remote Sensing data processing from all domains (radiometric atmospheric calibration and thematic mapping), Soil spectral libraries Soil Spectroscopy background Protocols for flight campaigns arrangement and field study. Theoretical and practical knowhow in hyperspectral remote sensing *	Access Rights to Background will only be granted to the extent is not subject to terms and conditions in other agreements. Access Rights to Background will only be granted to the extent that is Needed for the implementation of the Project.	Access Rights to Background will only be granted to the extent is not subject to terms and conditions in other agreements. Access Rights to Background will be subject to written requests, will only be granted to the extent Needed for Exploitation of a Party's own Results and will only be granted on Fair and Reasonable conditions.
<b>CUT</b>	CUT will provide Lidar datasets (aerosol properties vertical profiles) prior of the project period for the	Will be available to the project beneficiaries under request for the	No data will be available to external end users.



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	implementation of the pilot study to the RoI. Data collected by CUT's external collaborators and are available to CUT team for the project implementation.	implementation of the WP-4 The data can be used only for the project's purposes and only during the life time of the project under the approval of the Responsible authority.	No data will be available to external end users.
<b>INOE</b>	National Institute Of Research and Development for Optoelectronics shares, within the GEO-CRADLE consortium, all data and other information necessary to carry out GEO-CRADLE activities.	Access rights to background created by personnel or research groups not explicitly involved in the project or to background created in the framework of other collaborations may be limited if subject to related third party rights or confidentiality obligations	
<b>IPB</b>	Dust Regional Atmospheric Model (DREAM)	The DREAM model as a intellectually protected software of Dr Slobodan Nickovic (the participant in the project) can be used only for the project purposes during its duration. For any other model use, an agreement with the author will be needed	n/a
	Hydrology Prognostic Model (HYPROM)	The HYPROM model as a intellectually protected software of Dr Slobodan Nickovic and Goran Pejanovic (the participants in the project) can be used only for the project purposes during its duration. For any other model use, an agreement with the authors will be needed	
<b>CIMA</b>	n/a	n/a	n/a
<b>INOSENS</b>	n/a	n/a	n/a
<b>EARSC</b>	n/a	n/a	n/a
<b>EURISY</b>	User needs analysis – methodology	n/a	n/a
	Communication, dissemination and stakeholder involvement methodology	n/a	n/a
<b>EGS</b>	n/a	n/a	n/a

Table 4: GEO-CRADLE project background (as of December 2015)



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