



## D1.3: Data Management Plan

### WP1 – Project Management & Quality assurance

Authors: George Karavias, Christos Karakonstantinos, George Voutsinos



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## D1.3 Data Management Plan

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| <b>Other authors</b>          | Christos Karakonstantinos (KARAVIAS), George Voutsinos (KARAVIAS) |                             |                  |
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# Abbreviations

|  |                 |
|--|-----------------|
| Advisory Board                                   | AB              |
| Agricultural Insurance                           | AgI             |
| Application Programming Interface                | API             |
| Climate Prediction Centre                        | CPC             |
| Comma Separated Values                           | CSV             |
| Data Management Plan                             | DMP             |
| Digital Object Identifier                        | DOI             |
| Dissemination Exploitation Communication         | DEC             |
| Earth Observation                                | EO              |
| European Commission                              | EC              |
| Findable, Accessible, Interoperable and Reusable | FAIR            |
| Global Forecasting System                        | GFS             |
| Graph Modeling Language                          | GML             |
| Horizon 2020                                     | H2020           |
| Landsat-8 Surface Reflectance Level-2            | LaSRC           |
| Leaf Area Index                                  | LAI             |
| Letter of Support                                | LoS             |
| Lighthouse Customers                             | LHC             |
| Normalised Difference Vegetation Index           | NDVI            |
| Open Access                                      | OA              |
| Structured Query Language                        | SQL             |
| Synthetic Aperture Radar                         | SAR             |
| Variable Local Analysis and Prediction System    | vLAPS           |
| Vegetation Indices                               | VI <sub>s</sub> |
| Weather Intelligence Component                   | WIC             |
| Web Mapping Service                              | WMS             |
| Work Packages                                    | WP              |



# Executive summary

The purpose of the current deliverable is to present the 1<sup>st</sup> Data Management Plan (DMP) of the BEACON project. This deliverable has been compiled with the collaborative work among the coordinator and the consortium partners who are involved in data collection, production and processing.

The scope of the DMP is to describe the data management life cycle for all datasets to be collected, processed and/ or generated in all Work Packages (WP) during the course of 37 months of the BEACON project. FAIR Data Management is highly promoted by the European Commission (EC) and since BEACON is a data intensive project, relevant attention has been given to this task.

However, the DMP is a living document in which information will be made available on a more detailed level through updates as the implementation of the BEACON project progresses and when significant changes occur. This document is the initial of the three versions to be produced for the DMP throughout the BEACON project's duration.

The deliverable is structured in the following chapters:

**Chapter 1: Introduction** – Includes an introduction to the deliverable.

**Chapter 2: Methodology** – Includes a description of the methodology used, an analysis of the chapters of the provided template and last the methodological steps followed in BEACON.

**Chapter 3: DMP Components in BEACON** – Includes a description of the datasets to be used in BEACON reflected on the template provided by EC.



# 1. Introduction

The Deliverable D1.3 Data Management Plan represents the first version of the DMO of the BEACON project. BEACON is an Innovation Action project funded under the H2020 program of the EC that will last 37 months. Therefore, BEACON participates in ORD Pilot, and, thus, is providing, as requested, the current deliverable seven months after the beginning of the project.

The current deliverable aims to ensure proper and sound management of the research data that will be collected, processed and/ or generated within BEACON. The main objectives of the document are to a) detail the handling of research data during and after the project, b) describe the methodology and standards required, c) identify whether and how data will be shared, exploited or made accessible for verification, and re-used, and d) identify how they will be curated and preserved.

The DMP is a living document which will be evolved during the whole lifespan of the project. The current document is the first of the three versions to be delivered throughout the BEACON project. The second version (D1.4) will be delivered on M25 and the final one (D1.5) on M37.





## 2. Methodology

The DMP methodology approach that has been used for the compilation of the D1.3 has been based on the updated version of the “Guidelines on FAIR Data Management in Horizon 2020<sup>1</sup>” version 3.0 released on 26 July 2016 by the EC Directorate – General for Research & Innovation.

The BEACON DMP addresses the following issues:

- ④ Data Summary
- ④ FAIR data
  - ④ Making data findable, including provisions for metadata
  - ④ Making data openly accessible
  - ④ Making data interoperable
  - ④ Increase data re-use
- ④ Allocation of resources
- ④ Data security
- ④ Ethical aspects
- ④ Other issues

The BEACON project coordinator (KARAVIAS) has provided on time all the WP leaders and rest of the partners with a template that includes all the 10 aforementioned issues along with instructions to fill it in.

### 2.1. Data Summary

The Data Summary addresses the following issues:

- ④ What is the purpose of the data collection/ generation and its relation to the objectives of the project?
- ④ What types and formats of data will the project generate/ collect?
- ④ Will you re-use any existing data and how?
- ④ What is the origin of the data?
- ④ What is the expected size of the data?
- ④ To whom might the data be useful (“data utility”)?

The BEACON project output will be an operational platform that will provide a set of risk management tools based on calculation of agricultural parameters through the use of Earth Observation (EO) data. Therefore, the majority of the data will fall into the following categories:

- ④ Satellite and EO data
- ④ Meteorological data from various sources (National Climatic Data Center Global Surface Summary of Day and Global Historical Climate Network Dataset, European Climate Assessment & Dataset)

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<sup>1</sup> European Commission, (26 July 2016), *Guidelines on FAIR Data Management in Horizon 2020, Version 3.0*



- ④ Auxiliary data such as EU-DEM Digital Elevation Model, Parcel boundaries (provided by the users of the service)
- ④ Orthophoto maps, ISRIC World Soil Information Institute 1km Soil Grids database

At this stage of the project these data are not in any way all-inclusive but provide a basis from which BEACON project has developed the user requirements in relation to the BEACON toolbox.

The types of data that will be generated and are going to be offered under various data licenses are;

- ④ Near real-time disease and weather event risk monitoring
- ④ Damage estimation

Privacy issues will be taken into account in order to ensure that no personal or sensitive data of any insured farmer are dispersed. Furthermore, near real-time data and services generated by BEACON are intended for commercial use: interested users will have to pay a subscription fee in order to have access to the services. However, these services will be available under an open data license for exploitation by individuals, public and private sector, education with a delayed access after the passing of a specified “embargo period”, which will be two crop growing seasons. After the given “embargo period” further data sharing and accessibility for verification and re-use will be available through the BEACON platform open to anyone.

Within BEACON all personal data used in the project will be protected and all partners will fully comply with the applicable national, European and international framework, and the European Union's General Data Protection Regulation 2016/679. When possible, the data collected in the project will be available to third parties in contexts such as scientific scrutiny and peer review.

Finally, it is expected that the BEACON project will result in a number of publications in scientific, peer-reviewed journals. Project partners are encouraged to collaborate with each other and jointly prepare publications relevant to the BEACON project. Scientific journals that provide open access (OA) to all their publications will be preferred, as it is required by the European Commission.

## 2.2. FAIR data

### 2.2.1. Making data findable, including provisions for metadata

This point addresses the following issues:

- ④ Are the data produced and/ or used in the project discoverable and identifiable?
- ④ What naming conventions are they followed?
- ④ Will search keywords be provided that optimize possibilities for re-use?
- ④ Are clear version numbers provided?
- ④ What metadata will be created?

This point refers to existing suitable standards of the discipline, as well as an outline on how and what metadata will be created. Therefore, at this stage, the available data standards (if any) accompany the description of the data that will be collected and/or generated, including the description on how the data



will be organised during the project, mentioning for example naming conventions, version control and folder structures.

As far as the metadata are concerned, a number of standards for open data is already available that be applied to applications related to the ones proposed by the BEACON project. These include the EU Directive 2007/2/EC on Infrastructure for Spatial Information in the European Community (INSPIRE) which addresses spatial data themes needed for environmental applications (<http://inspire.jrc.ec.europa.eu/>). A number of best practices and guidelines for working with Open Data are also available, mostly by organisations or institutions that support and promote Open Data initiatives. These include:

- ④ Open Data Foundation (<http://www.opendatafoundation.org/>)
- ④ Open Knowledge Foundation (<https://okfn.org/>)
- ④ Open Government Standards (<http://www.opengovstandards.org/>)

These initiatives will be carefully considered in order to ensure the biggest impact of our data.

#### *2.2.2. Making data openly accessible*

The objectives of this point address the following issues:

- ④ Which data produced and/ or used in the project will be made openly available as the default?
- ④ How will the data be made accessible (e.g. by deposition in a repository)?
- ④ What methods or software tools are needed to access the data?
- ④ Is documentation about the software needed to access the data included?
- ④ Is it possible to include the relevant software (e.g. in open source code)?
- ④ Where will the data and associated metadata, documentation and code be deposited?
- ④ Have you explored appropriate arrangements with the identified repository?
- ④ If there are restrictions on use, how will access be provided?
- ④ Is there a need for a data access committee?
- ④ Are there well-described conditions for access (i.e. a machine-readable license)?
- ④ How will the identity of the person accessing the data be ascertained?

#### *2.2.3. Making data interoperable*

This point describes the assessment of the data interoperability specifying what data and metadata vocabularies, standards or methodologies are followed in order to facilitate interoperability. Moreover, it addresses whether standard vocabulary is used for all data types present in the data set in order to allow inter-disciplinary interoperability. Specifically, it addresses the following issues:

- ④ Are the data produced in the project interoperable?
- ④ What data and metadata vocabularies, standards or methodologies will you follow to make your data interoperable?
- ④ Will you be using standard vocabularies for all data types present in your dataset, to allow inter-disciplinary interoperability?
- ④ In case it is unavoidable that you use uncommon or generate project specific ontologies or vocabularies, will you provide mappings to more commonly used ontologies?



### 2.2.4. Increase data re-use

This point addresses the following issues:

- ④ How will the data be licensed to permit the widest re-use possible?
- ④ When will the data be made available for re-use?
- ④ Are the data produced and/ or used in the project useable by third parties, in particular after the end of the project?
- ④ How long is it intended that the data remains re-usable?
- ④ Are the data quality assurance processes described?

## 2.3. Allocation of resources

The objectives of this point address the following issues:

- ④ What are the costs for making data FAIR for your project?
- ④ How will these be covered?
- ④ Who will be responsible for data management in your project?
- ④ What are the costs and potential value of long-term preservation?

## 2.4. Data security

This point addresses data recovery as well as secure storage and transfer of sensitive data. Specifically, this point addresses:

- ④ Is the data safely stored in certified repositories for long-term preservation and curation?
- ④ What provisions are in place for data security?

## 2.5. Ethical aspects

This point covers the context of the ethics review, ethics section of DoA and ethics deliverables including references and related technical aspects. Specifically, it addresses the following issues:

- ④ Are there any ethical or legal issues that can have an impact on data sharing?
- ④ Is informed consent for data sharing and long-term preservation included in questionnaires dealing with personal data?

## 2.6. Other issues

Other issues refer to other national/ funder/ sectorial/ departmental procedures for data management that are used.



# 3. DMP Components in BEACON

## 3.1. DMP Components in WP1 – Project management & Quality assurance (KARAVIAS)

| DMP Component  | Issues to be addressed  |
|--|---|
| <p>Data Summary</p>  | <p>Contact details of the project partners</p> <p>Databases containing all the necessary information regarding the project partners.</p> <p>The project partners data are stored on a simple table (excel file) and it is stored on the BEACON dropbox folder, with the following fields (per partner):</p> <ul style="list-style-type: none"> <li>⊗ Name</li> <li>⊗ Email</li> <li>⊗ Phone</li> <li>⊗ Mobile</li> <li>⊗ Skype id</li> </ul> <p>Furthermore, consortium meetings have been conducted remotely every month in order to discuss the project progress and address any important issue. Most meetings have been contacted either using Skype or Gotomeeting. Minutes have been prepared after each meeting and are stored on the BEACON dropbox folder (docx. format).</p> <p>The expected size of the data is not applicable, as the size is not a meaningful measure. Until now five meetings have been held.</p> <p>Moreover, WP leaders have sent input on how they handle the data produced during the project and all the partners provided input with regards to the Risk Management Plan.</p> |
| <p>Making data findable, including provisions for metadata</p> | <p>The data with regards to the remote meetings are stored on KARAVIAS server and in the BEACON dropbox folder. The data are not directly accessible from outside. Moreover, these data cannot be made available to third parties.</p>  |



|                               |  |
|-------------------------------|--|
|                               | <p>However, the input provided with regards to the data and risk management will be available in D1.3 Data management plan, D1.4 Data management plan (2), D1.5 Data management plan (3), D1.6 Risk management plan, D1.7 Risk management plan (2) and D1.8 Risk management plan (3). The dissemination level of these deliverables is public and they are available in the project’s website (<a href="http://beacon-h2020.com/">http://beacon-h2020.com/</a>), dropbox folder and in Zenodo<sup>2</sup> (<a href="https://zenodo.org/communities/beacon_h2020/">https://zenodo.org/communities/beacon_h2020/</a>) through the Digital Object Identifier (DOI).</p> <p>The naming conventions used for these data are:</p> <ul style="list-style-type: none"> <li>🌐 Data_WP1_1_Data Management Plan</li> <li>🌐 Data_WP1_2_Risk Management Plan</li> </ul> <p>As part of any stored data, metadata will be generated, which include sufficient information with appropriate keywords to help external and internal users to locate data and related information.</p> |
| Making data openly accessible | <p>The datasets are not publicly available.</p> <p>All the data are made publicly available as part of the aforementioned deliverables and through BEACON website, dropbox folder and Zenodo.</p>  |
| Making data interoperable     | N/A  |
| Increase data re-use          | <p>Data are publicly available as part of the aforementioned deliverables and can be accessed and re-used by third parties indefinitely without a license.</p>   |
| Allocation of resources       | <p>Resources have been allocated according to the project plan and WP1 allocated resources. No additional costs are foreseen for making this dataset FAIR.</p>   |
| Data security                 | <p>The data have been collected for internal use in the project, and not intended for long-term preservation. No personal information will be kept after the end of the project. Furthermore, KARAVIAS pays special attention to security and respects the privacy and confidentiality of the users' personal data by fully complying with the applicable national, European and</p>   |

<sup>2</sup> <http://zenodo.org/>



|                 |  |
|-----------------|--|
|                 | international framework, and the European Union's General Data Protection Regulation 2016/679. |
| Ethical aspects | N/A  |
| Other issues    | N/A  |

### 3.2. DMP Components in WP2 – Structural AgI value chain collaboration and co-evolution of business models and services (UBFCE)

#### 3.2.1. User requirements

| DMP Component | Issues to be addressed  |
|---------------|---|
| Data Summary  | <p>Questionnaires were designed during the user requirements collection and analysis process. The questionnaires were targeted to companies involved in AgI business, so called BEACON Lighthouse Customers. In addition, with 3 AgI companies (KARAVIAS, Agroseguro and Triglav) teleconference interviews were held and recorded. The responses collected both by questionnaires and interviews provided data such as:</p> <ul style="list-style-type: none"> <li>④ General information</li> <li>④ Companies’ geographical area of business activity</li> <li>④ Companies’ specific practices and business models</li> <li>④ Companies’ preferences related to BEACON solutions</li> </ul> <p>These data were processed by the BEACON technical partners and used to exact the user requirements for the BEACON toolbox. The user requirements will then enable us to develop user friendly and highly useful solutions for AgI business models.</p> <p>The feedback on the first questionnaire was collected in word document, and second questionnaire was provided to the AgI companies as a Google Form. The answers are download and organized in an excel file (.xlsx) of 12KB.</p> |



|   |   |
|---|---|
|   | The recorded interviews are stored as MP4 files of 47-75MB.   |
| Making data findable, including provisions for metadata | The data stored on the UBFCE servers. As it contains confidential and personal data, the raw data will not be made available from outside but anonymized data can be made available upon request and after an evaluation of the request (i.e. purposes, goals. etc.).<br>The naming convention used is:<br>Data_WP2_1_User requirements   |
| Making data openly accessible                           | The data will be kept closed until the end of the project due to data contain personal data and therefore, it cannot legally be made public.  |
| Making data interoperable                               | N/A   |
| Increase data re-use                                    | Any data published in papers will be immediately available to meta-analysis. However, it is not legal to release personal data such as the questionnaire responses.<br><br>Raw data contains personal data and cannot legally be made available.  |
| Allocation of resources                                 | Resources have been allocated according to the project plan and WP2 allocated resources. No additional costs are foreseen for making this dataset FAIR.   |
| Data security   | UBFCE servers are managed by the university IT services and they are regularly backed up and secure. UBFCE pays special attention to security and respects the privacy and confidentiality of the users' personal data by fully complying with the applicable national, European and international framework, and the European Union's General Data Protection Regulation 2016/679. |
| Ethical aspects   | N/A   |
| Other issues  | N/A   |

3.2.2. Co-creation

| DMP Component  | Issues to be addressed |
|--|------------------------|
|  |                        |



|  |   |
|--|---|
| <p>Data Summary</p>  | <p>The purpose of the data collection is to document the process of co-creation of BEACON toolbox; the development &amp; evaluation is one of the central objectives of the project.</p> <p>The AgI companies will be involved in testing of several BEACON versions during the development process. During each testing phase, the stakeholders will provide feedback by answering a questionnaire and through teleconference interactions,</p> <p>The following data formats will be produced:</p> <ul style="list-style-type: none"> <li>⊗ Excel database of stakeholders’ feedback;</li> <li>⊗ Audio documentation of teleconference interaction with stakeholders.</li> </ul> <p>The data will be used in the BEACON development process following Lean startup methodology. The data will be used by the technical partners in order to learn where to improve the system upon the stakeholders’ opinion and recommendations.</p> |
| <p>Making data findable, including provisions for metadata</p> | <p>The data will be stored on the UBFCE servers. As it may contain confidential and personal data, the raw data will not be made available from outside.</p> <p>The naming convention that will be used is:<br/>Data_WP2_2_Co-creation</p>  |
| <p>Making data openly accessible</p>                           | <p>The data will be kept closed until the end of the project due to data contain personal data and therefore it cannot legally be made public.</p>  |
| <p>Making data interoperable</p>                               | <p>N/A</p>  |
| <p>Increase data re-use</p>                                    | <p>Any data published in papers will be immediately available to meta-analysis. However, it is not legal to release personal data such as the questionnaire responses.</p> <p>Raw data contains personal data and cannot legally be made available.</p>   |
| <p>Allocation of resources</p>                                 | <p>Resources have been allocated according to the project plan and WP2 allocated resources. No additional costs are foreseen for making this dataset FAIR.</p>  |



|                 |   |
|-----------------|---|
| Data security   | UBFCE servers are managed by the university IT services and they are regularly backed up and secure. UBFCE pays special attention to security and respects the privacy and confidentiality of the users’ personal data by fully complying with the applicable national, European and international framework, and the European Union’s General Data Protection Regulation 2016/679. |
| Ethical aspects | N/A   |
| Other issues    | N/A   |

### 3.3. DMP Components in WP3 – Servitisation of Agri Business: Creating value by adding Earth Observation data products and services (AgroApps)

#### 4.3.1. Satellite Data Collection, Pre-processing System and EO Data Products

| DMP Component | Issues to be addressed   |
|---------------|--|
| Data Summary  | <p>In BEACON, EO data will be utilised, processed and “translated” to valuable information for the insurance companies to design their products and assess crop status and natural disasters. Applications based on EO Data, will provide insurance companies with a robust and cost-effective tool allowing them to:</p> <ul style="list-style-type: none"> <li>④ monitor a client’s crop status (vegetation, biophysical indices, yield estimation) through the use of EO-driven algorithms;</li> <li>④ assess crop damage, for claims pay-outs calculation, making use of time series of EO derived indices;</li> <li>④ inspect whether a submitted claim is legit, by remotely verifying if damage occurred in an insured parcel.</li> </ul> <p>The data collected are satellite datasets from both optical and SAR instruments.</p> <p>Optical reflectance imaging data will originate from three missions:</p> |



- ⊗ USGS for Landsat 8 (L8 OLI/TIRS L1T) data (<https://earthexplorer.usgs.gov/>);
- ⊗ Copernicus Scientific Hub for the acquisition of Sentinel-2 satellite images (<https://scihub.copernicus.eu/dhus/#/home>);
- ⊗ MODIS 8-day NDVI product (<https://gimms.gsfc.nasa.gov/MODIS/std/GMOD09Q1/>)

Synthetic Aperture Radar (SAR) will originate from:

- ⊗ Copernicus Scientific Hub for the acquisition of Sentinel-1 radar data (S1 L1 IW GRDH mode)

The task will produce pre-processed data:

- ⊗ Sentinel-2 BOA (GeoTiff format) will be generated using Sen2Cor processor for atmospheric, terrain and cirrus correction <http://step.esa.int/main/third-party-plugins-2/sen2cor>
- ⊗ Landsat-8 Surface Reflectance Level-2 (LaSRC) (GeoTiff format) from USGS Earth Explorer on demand service
- ⊗ Sentinel-1 GRD, radiometrically calibrated, terrain corrected (GeoTiff format)
- ⊗ MODIS 8-day NDVI Anomaly product

The data will be extracted for agricultural parcels registered for the validation and pilot phase of the project and stored in the BEACON operational database for further analysis.

#### ***Crop Monitoring Service***

After pre-processing, EO data will be used in algorithms for the effective monitoring of the crop condition variability in both space and time. Towards that aim, crop specific Vegetation Indices (VIs) will be calculated. VIs that will be provided through the crop monitoring service of BEACON, include:

- ⊗ LAI (Leaf Area Index);
- ⊗ canopy chlorophyll content;
- ⊗ above ground biomass;
- ⊗ estimated yield one month before harvest.



VIs values will be fine-tuned based on the in-situ data that will be collected in the context of BEACON project, as well as from other European projects (APOLLO, DIANA, etc.).

#### **Damage Assessment Calculator**

Change detection methodologies between pre- and post-calamity EO-derived indices will be employed to assess the insured parcel's crop damage. To ensure high temporal coverage of the data, the system will combine data from different optical sensors (Sentinel-2, Landsat 8, MODIS) with data from SAR sensor (Sentinel-1).

Damage-specific VIs will be implemented, considering:

- ④ flooded areas detection (mapping and statistics of the flooded and non-flooded area), with the use of optical and radar data;
- ④ burnt areas detection (mapping and statistics of the affected area and severity of the wildfire), with the use of optical data;
- ④ hail and wind damage detection (mapping and statistics of the severity of damage), through a combination of optical and radar satellite data;
- ④ crop growth anomaly detection due to drought conditions, based on in-season (Normalised Difference Vegetation Index) NDVI deviations from recorded historical data.

Crop damage assessment calculator will be validated and calibrated based on recorded crop damage historical datasets provided by the Lighthouse customers and during the pilot phase. The service will provide visual damage maps of the affected area accompanied by the relative indices and statistics.

#### **Parcel Anti-Fraud Inspector**

By combining remote crop damage assessment and weather events the insurer will be able to verify whether a calamity has taken place and damage occurred in the insured parcel.

Size of the satellite raw data:

- ④ Landsat8 OLI L1T/L2: Raw zipped image per tile size is 1GB, while unzipped is 1.6GB;
- ④ Sentinel-2 MSI L1C/L2: Raw zipped image per tile size, including all bands, is 600MB;





- ④ Sentinel-1 L1 IW GRDH: Raw zipped image per tile size, including both polarizations and two satellites (S1A, S1B) data, is 1 GB.
- ④ GIMMS MODIS Terra NDVI 9x9 degree Tiles (15 MB per Tile)

Size of the input data:

Considering that the project’s pilot phase will last two years and that both winter (wheat and barley) and summer (maize and soybean) crops will be monitored, satellite imagery should be available for 24 months. Based on the satellite, the size of the required input data is as follows:

- ④ Sentinel-2 L2A, BOA: 600 MB x 52 days (considering a mean 7 days revisit period) x 6 tiles (pilot areas: Serbia 2 tiles, Greece 2 tiles, Spain 2 tiles), equals to 187.2 GB.
- ④ Sentinel-1 CGR: 1 GB x 61 days (considering a mean 6 days revisit period) x 6 tiles, equals to 366 GB.
- ④ Landsat-8 SR: 1.6 GB x 23 days (considering a mean 16 days revisit period) x 6 tiles, equals to 221 GB.
- ④ MODIS NDVI Anomaly: 2 years x 46 (8-day composites) x 3 Tiles x 15 MB equals to 4.2 GB

This is a gross estimation, presenting the worst-case scenario. The images in many occasions will be covered with clouds. The clouds will be cropped out together with unnecessary areas, so the real image size will be smaller. For change detection purposes, only a very small percentage of clouds will be considered acceptable.

Making data findable, including provisions for metadata

INSPIRE metadata will be created for all the EO-based geospatial products that will be generated in the lifetime of the project. Metadata stored in the BEACON operational database together with the raster file such as date, bounding box, projection, mission will be useful for discoverability of the data. The collected imagery will not be available for insurers or farmers. The processed data and the derived indices and parameters will be available to registered partners, lighthouse customers and farmers, through map display and reports. In addition, each dataset produced will be associated to a unique ID



|                                      |  |
|--------------------------------------|--|
|                                      | <p>corresponding to the area of interest requested. Naming conventions for the image data will be:</p> <ul style="list-style-type: none"> <li>④ S2_BOA_[ID]_[YYYYMMDD].tiff (e.g. S2_BOA_AGRO_158_20190808 for the tile requested by the Lighthouse customer Agroseguro and is associated to registered parcel AGRO_158, which was received on 2019/08/08)</li> <li>④ L8_BOA_[ID]_[YYYYMMDD].tiff</li> <li>④ S1_CGR_[ID]_[YYYYMMDD].tiff</li> </ul> <p>After processing, the produced data will have the following names:</p> <ul style="list-style-type: none"> <li>④ NDVI_[ID]_[YYYYMMDD].tiff (e.g. NDVI_AGRO_158_20190808 for the parcel AGRO_158 requested by the Lighthouse customer Agroseguro and was received on 2019/08/08)</li> <li>④ LAI_[ID]_[YYYYMMDD].tiff</li> <li>④ BIOMASS_[ID]_[YYYYMMDD].tiff</li> <li>④ CHL_[ID]_[YYYYMMDD].tiff</li> <li>④ YIELD_[ID]_[YYYYMMDD].tiff</li> </ul> <p>Change detection derived data will have the following names, based on the parcel ID, the date of the extreme weather event and the type of the used index:</p> <ul style="list-style-type: none"> <li>④ DAMAGE_NDVI_[ID]_[YYYYMMDD]</li> </ul> |
| <p>Making data openly accessible</p> | <p>Only project partners and Lighthouse customers participating in the pilot phase of the project will have unlimited access to products related to their registered parcels, for the duration of the project. All the data, associated metadata and documentation will be deposited into the official BEACON web server and made available through RESTful API and Geoserver's web mapping service (WMS). Raw satellite data that will be used for the development and delivery of the relevant products will not be available and accessible to partners and/or LHC and hence will not be open for reuse.</p> <p>Only web browser and Internet access are needed to access the data.</p>   |
| <p>Making data interoperable</p>     | <p>The input and output data will be available in GeoTiff or (Graph Modeling Language) GML format with associated metadata and accessible through GeoServer application, Map server application, PostGIS database and RESTful API.</p>   |



|                         |   |
|-------------------------|---|
|                         | INSPIRE protocol will be used for metadata descriptors. INSPIRE provides typical standard for geospatial data.  |
| Increase data re-use    | <p>The EO-based products will be accessible for use to all BEACON project partners and lighthouse customers participating in the pilot phase through RESTful API from the BEACON database. Raw satellite data that will be used for the development and delivery of the relevant products will not be available and accessible to partners and/or LHC and hence will not be open for reuse.</p> <p>Appropriate licensing agreement will be required for data access after the project's conclusion, which will be defined through the business model during the course of the project.</p> <p>The EO-based products will be usable by third parties through RESTful API, but only for those parties who are part of the project and during the lifespan of the project.</p> |
| Allocation of resources | Resources have been allocated according to the project plan and WP3 allocated resources. No additional costs are foreseen for making this dataset FAIR.   |
| Data security           | All the data will be stored in the BEACON server for the purpose of servicing data and also on a separate storage server, both with backup procedures. These servers are managed by the AgroApps IT department. AgroApps fully complies with the applicable national, European and international framework, and the European Union's General Data Protection Regulation 2016/679.   |
| Ethical aspects         | N/A   |
| Other issues            | N/A   |

4.3.2. Operational EO data provision and DIAS integration and Climate data provision

| DMP Component | Issues to be addressed  |
|---------------|---|
| Data Summary  | <p><b>Operational EO data provision and DIAS integration</b></p> <p>Real-time atmospheric data will be produced by ingesting and assimilating data from surface weather stations and satellite radiances using the variable Local Analysis and Prediction System (vLAPS) and analysis</p> |



and near to analysis forecasts from the Global Forecasting System (GFS). To enhance the accuracy and the spatial resolution of the minimum and maximum temperature at 2 m height, and of the daily amount of precipitation, the produced gridded atmospheric fields from the vLAPS model will be further processed using a spatio-temporal Kriging regression methodology. These data will be used for the verification of extreme weather events that take place in the insured parcels.

#### Climate Data provision

The high-resolution medium range weather forecasts will be based on the operation of the WRF-ARW numerical weather prediction model, using the GFS analysis and forecasts fields of the 12 UTC forecast cycle to define the initial and lateral boundary conditions, accordingly. The produced weather forecasts will have a forecast horizon of 7 days, with hourly temporal resolution and a varying spatial resolution ranging from 2x2 km for the first 72 hours to 6x6 km from the 73rd forecast hour until the 168th forecast hour.

The provided seasonal climate forecasts will be based on the CFSv2 and C3S forecasts produced by the Climate Prediction Centre (CPC) of the US and the Copernicus Climate Change Service, respectively. CFS forecasts will be downloaded every 6-hours when forecasts from a new forecast cycle will be available. Every day, the 40 downloaded forecasts of the last 10 days will be used to compute the ensemble statistical moments of the temperature and relative humidity of 2m high, wind of 10m high and daily accumulated precipitation, as well as the probability distribution of the forecasted above-mentioned variables. The ensemble forecast will be further enhanced with the monthly addition of the 1st day of the C3S ensemble seasonal forecasts. The final product will be updated every day and will be valid for the next 6 months.

Medium Range and Seasonal forecasting data will originate from:





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|  | <p>⊗ the Weather Intelligence Component (WIC), delivered by AGROAPPS team, which is a suite of climate and weather services. The provided services include high resolution short- and medium-range weather forecasts, early warnings for extreme weather events, real-time and historical high-resolution gridded climate data, and they are produced by operating in-house state of the art numerical weather prediction models, combined with advanced data assimilation of open atmospheric and EO-derived land surface observations. The Weather intelligence service package component is offered through a RESTful API.</p> <p>Size of the data:</p> <p>Daily downloaded meteorological data from the Global Numerical Weather Prediction Models, including MADIS observations are approximately 8.4 GB. Daily meteorological products size for near real time weather observations and 7-day forecasting are approximately 12.3 GB.</p> <p>Seasonal weather forecasts (6-month products) result in 3.63 GB data per month, therefore a total of approximately 22 GB.</p> <p>Climatology data for the Weather Risk Probability service of BEACON occupy a standard size of 290 GB and originate from ERA5 historical observations. The ERA5 data are updated yearly with a total of 7.25 GB data covering the European Continent.</p> <p>Generated and collected data are available in the following types and formats:</p> <p>Gridded meteorological data are in .GRIB format and are transformed in .NetCDF file types.</p> |
| <p>Making data findable, including provisions for metadata</p> | <p>Metadata such as creation date, version, bounding box, projection, quality of the data will be useful for discoverability of the data. Only registered partners and lighthouse customers will be able to find meteorological and climatic data for their parcels and for a specific date.</p>  |



|                                      |   |
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|                                      | <p>Naming conventions for the data will be in the form:</p> <p>📍 temp_[ID]_[YYYYMMDD] (e.g. temp_AGRO_158_20190530), that is the temperature requested by Agroseguro lighthouse customer for day 30/05/2019 and for parcel with ID AGRO_158</p>   |
| <p>Making data openly accessible</p> | <p>Only project partners and lighthouse customers participating in pilots will have permissions to access the data. Clients (farmers) of the participants will also have access to the data, during the pilot phase. All the data, associated metadata and documentation will be deposited on official BEACON web server and available through RESTful API and Geoserver's WMS. Raw data that will be used for the development and delivery of the relevant products will not be available and accessible to partners and/or LHC and hence will not be open for reuse.</p> <p>Only web browser and Internet access are needed to access the data.</p>   |
| <p>Making data interoperable</p>     | <p>The data will be in GeoTiff, csv or GML format with associated metadata and provided through RESTful API. Based on that, there is possibility for using in various open software applications.</p>   |
| <p>Increase data re-use</p>          | <p>The data will be accessible for use to all BEACON project partners and lighthouse customers participating in the pilot phase through RESTful API from the BEACON database. Raw data that will be used for the development and delivery of the relevant products will not be available and accessible to partners and/or LHC and hence will not be open for reuse.</p> <p>Appropriate licensing agreement will be required for data access after the project's conclusion, which will be defined through the business model during the course of the project.</p> <p>The products will be usable by third parties through RESTful API, but only for those parties who are part of the project and during the lifespan of the project.</p> |



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| Allocation of resources | Resources have been allocated according to the project plan and WP3 allocated resources. No additional costs are foreseen for making this dataset FAIR.   |
| Data security           | All the data will be stored in the BEACON server for the purpose of servicing data and also on a separate storage server, both with backup procedures. These servers are managed by the AgroApps IT department. AgroApps fully complies with the applicable national, European and international framework, and the European Union's General Data Protection Regulation 2016/679. |
| Ethical aspects         | N/A   |
| Other issues            | N/A   |

#### 4.3.3. Crop Loss Assessment – Crop Growth Models

| DMP Component | Issues to be addressed   |
|---------------|--|
| Data Summary  | <p>A crop loss assessment methodology will be developed. Among other tools, crop growth models will be used to predict the potential crop yield as affected only by the climate variability and forecasted weather trends. Seasonal climate forecasts until the end of the upcoming growing season will provide the required daily meteorological input for the crop models.</p> <p>Comparing seasonal yield prediction with historical yield data and past causality, will provide insurance companies with the ability to estimate the magnitude of occurred damage with a greater accuracy.</p> <p>Input files will include:</p> <ul style="list-style-type: none"> <li>☉ daily meteorological parameters for the duration of the growing season (gridded data). The forecasted values will be updated with the observed values, at the end of each month during the simulation period. Through an iterative procedure, a new, more accurate yield prediction will be available by the end of the month. The process will continue</li> </ul> |



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|  | <p>generating and substituting yield predictions until the end of the growing season;</p> <ul style="list-style-type: none"> <li>④ crop type;</li> <li>④ parcel area;</li> <li>④ growing season length and defined phenological growth stages per crop;</li> <li>④ historical crop yield datasets (gridded data).</li> </ul> <p>The following data formats will be used for the input files of the crop growth models:</p> <ul style="list-style-type: none"> <li>④ .txt</li> <li>④ .xlsx</li> <li>④ .shp (raster and vector data)</li> <li>④ .GRIB (gridded yield data)</li> <li>④ .NetCDF</li> </ul> <p>Size of the data</p> <p>The output data (results) are available in NetCDF files, with a spatial resolution of 25 x 25 km. Output data per country will be mapped and the final user will have the ability to switch between crops and display the results. Information per parcel will also be provided, related to the grid cell where the parcel belongs. Results in the parcel level will be displayed in graphs and tables.</p> <p>Gridded file size is 500 MB for each crop. Depending on the length of the growing season (6 or 7 months) a file will be created and stored for every month. Accounting for 9 crops the estimated total annual file size is estimated as 500 MB x 9 crops x 7 months equals to 40.5 GB.</p> |
| <p>Making data findable, including provisions for metadata</p> | <p>Metadata such as creation date, version, bounding box, projection, quality of the data will be useful for discoverability of the data. Only registered partners and lighthouse customers will be able to find crop yield data for their parcels and countries.</p> <p>Naming conventions for the data will be in the form: COUNTRY_[ID]_[CROP TYPE]_[YYYYMM] (e.g. SPAIN_AGRO_158_MAIZE_201908, that is the predicted maize crop yield for Spain related to parcel AGRO_158 registered by Agroseguro lighthouse customer, updated for month August 2019).</p>  |



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| <p>Making data openly accessible</p> | <p>Only project partners and Lighthouse customers participating in the pilot phase of the project will have unlimited access to results related to their registered parcels and country, for the duration of the project. All the data, associated metadata and documentation will be deposited into the official BEACON web server and made available through RESTful API and Geoserver's WMS. Raw data that will be used for the development and delivery of the relevant products will not be available and accessible to partners and/or LHC and hence will not be open for reuse.</p> <p>Only web browser and Internet access are needed to access the data.</p>  |
| <p>Making data interoperable</p>     | <p>The input and output data will be made available in GeoTiff format with associated metadata and accessible through GeoServer application, Map server application, PostGIS database and RESTful API. INSPIRE protocol will be used for metadata descriptors. INSPIRE provides typical standard for geospatial data.</p>  |
| <p>Increase data re-use</p>          | <p>The data will be accessible for use to all BEACON project partners and lighthouse customers participating in the pilot phase, through RESTful API from the BEACON database. Raw data that will be used for the development and delivery of the relevant products will not be available and accessible to partners and/or LHC and hence will not be open for reuse.</p> <p>Appropriate licensing agreement will be required for data access after the project's conclusion, which will be defined through the business model during the course of the project.</p> <p>The products will be usable by third parties through RESTful API, but only for those parties who are part of the project and during the lifespan of the project.</p> |
| <p>Allocation of resources</p>       | <p>Resources have been allocated according to the project plan and WP3 allocated resources. No additional costs are foreseen for making this dataset FAIR.</p>   |



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| Data security   | All the data will be stored in the BEACON server for the purpose of servicing data and also on a separate storage server, both with backup procedures. These servers are managed by the AgroApps IT department. AgroApps fully complies with the applicable national, European and international framework, and the European Union's General Data Protection Regulation 2016/679. |
| Ethical aspects | N/A   |
| Other issues    | N/A   |

4.3.4. Operational Data Products Validation

| DMP Component | Issues to be addressed  |
|---------------|---|
| Data Summary  | <p>Historical reference data from various sources (measurements and ground truth data from partners, lighthouse customers and farmers) will be collected and harmonized to act as a baseline for EO products validation and evaluation. Data collected during the two-year pilot phase of the project will also be used for validation purposes. The aim is the qualitative and quantitative assessment of the performance of the EO-derived algorithms and models in terms of precision (random errors) and accuracy (systematic biases) with respect to the spatio-temporal target scale of the BEACON services. Depending on the data structure and availability, appropriate validation methods and statistical procedures will be selected and applied. The results of the validation will be documented in reports, along with recommendations about adjustments.</p> <p>Historical data on crop damage occurred in the field should include the following information:</p> <ul style="list-style-type: none"> <li>④ crop type</li> <li>④ event causing the damage</li> <li>④ date of damage</li> <li>④ parcel size and polygon geospatial data</li> <li>④ expected yield before the calamity</li> <li>④ yield received after the calamity</li> </ul> |



These data will be used for validating the damage assessment calculator. Furthermore, historical final yield data will also be provided for fine tuning the EO-derived algorithms that calculate the crops biophysical parameters and estimate yield before harvest.

During the pilot phase, in situ data will be collected in order to keep track of the performance and impact of the BEACON Toolbox. The data will be collected by the pilot partners and will include all the required information on occurred damage and biophysical parameters.

The following data formats will be used for validation purposes:

- ④ .csv
- ④ .xlsx
- ④ .kml
- ④ .shp (raster and vector data)

#### Size of the data

Commenting on the data size that will be managed for validation of damage assessment services, BEACON aspires to use 400 – 500 event cases from the years 2016 to 2018. This implies some extra EO data for the validation and evaluation of the service.

The 250 validation event cases for hail damage require the use of an optical multispectral image pair and a SAR image pair (pre – post event image) for each event. Each EO tile date represents an event and usually covers a large number of parcel cases. A rough estimation is that 80 multispectral images (Landsat 8/Sentinel 2) with an estimated size of 120 GB and 80 SAR images with an estimated size of 80 GB will be required.

The Drought damage assessment tool will be validated with 150 ground truth data cases, over the time span of 2016 – 2018. A full NDVI anomaly timeseries will be created for each of the test sites, which means an approximate size of 6.3 GB MODIS data.

For the flood damage assessment, 100 event cases of ground truth data will be handled, with an aspiring goal to monitor at least 8 major flooding events. For each



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|   | <p>event a sextuplet (6) of S1 SAR images will be used in order to capture the flood phenomenon evolution, and to test the change detection tool. This accounts for 48 images, or approximately 50 GB of data.</p>   |
| Making data findable, including provisions for metadata | <p>Validation data will be locally hosted at BEACON server. For each dataset, related metadata will describe data structure and methodology used to collect and validate the data. Only the technical team will have access to these data and they will not be used on the BEACON platform.</p> <p>The naming convention used is: Data_WP3_1_Validation data.</p>  |
| Making data openly accessible                           | <p>Damage data used for validation purposes is confidential and provided under a confidentiality agreement between AgroApps and the partners or lighthouse customers. All data will be locally hosted at the BEACON server.</p> <p>The validation process will follow the current state-of-the-art methodologies and the results will be presented as a report. Reports will be available to the partners.</p> |
| Making data interoperable                               | <p>The following data formats will be produced:</p> <ul style="list-style-type: none"> <li>📄 .csv</li> <li>📄 .xlsx</li> <li>📄 .pdf</li> <li>📄 .shp (raster and vector data)</li> </ul> <p>These data files will be useful mainly to the BEACON project partners and BEACON Lighthouse Customers for evaluation purposes.</p>   |
| Increase data re-use                                    | <p>The validation report will be available only to the partners of the project.</p>  |
| Allocation of resources                                 | <p>Resources have been allocated according to the project plan and WP3 allocated resources. No additional costs are foreseen for making this dataset FAIR.</p>   |
| Data security   | <p>The confidential data (raw data) will be placed in a password area on the BEACON database which is managed by the AgroApps technical team. AgroApps</p>   |





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|                 | fully complies with the applicable national, European and international framework, and the European Union's General Data Protection Regulation 2016/679. Furthermore, the technical team (AgroApps) has signed three Confidentiality Agreements with the partner UPM and the Lighthouse Customers (Interamerican & Triglav) in order to process and use these data. |
| Ethical aspects | No data referring to parcels' geospatial information, as well as personal farmers' information will be distributed within the described historical or pilot cases reports.  |
| Other issues    | N/A   |

#### 4.4. DMP Components in WP4 – BEACON toolbox services & functions ecosystem: design and implementation (BEACON toolbox design and implementation) (AgroApps)

##### 4.4.1. System Architecture

| DMP Component   | Issues to be addressed  |
|---|---|
| Data Summary  | <p>Functional and non-functional aspects, technical capabilities, components descriptions and dependencies, API descriptions, information flow diagrams, internal and external interfaces, software and hardware requirements and testing procedures related to data specified and validated among the BEACON technical, pilot partners and Lighthouse Customers (LHC).</p> <p>Technical requirement reports will be created in order to describe the aforementioned procedures and requirements for all the pilots.</p> <p>These reports will be the basis upon which the system will be developed and further modified.</p> |
| Making data findable, including provisions for metadata | The reports will be stored on AgroApps server and will not be directly accessible from outside. Moreover, these data will be neither available to third parties nor discoverable and accessible to the public, since the  |



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|                               | <p>level of dissemination of the respective deliverable D4.1 Overall architecture and system design specification is confidential.</p> <p>The naming convention used is: Data_WP4_1_System Architecture.</p> <p>No metadata will be produced.</p>  |
| Making data openly accessible | Only the technical team will have access to these data.  |
| Making data interoperable     | N/A  |
| Increase data re-use          | N/A  |
| Allocation of resources       | Resources have been allocated according to the project plan and WP4 allocated resources. No additional costs are foreseen for making this dataset FAIR.  |
| Data security                 | The data will be collected for internal use in the project, and it is not intended to be preserved for long-term. Furthermore, AgroApps fully complies with the applicable national, European and international framework, and the European Union's General Data Protection Regulation 2016/679. |
| Ethical aspects               | N/A  |
| Other issues                  | N/A  |

#### 4.4.2. BEACON Platform

| DMP Component | Issues to be addressed  |
|---------------|---|
| Data Summary  | <p>Various data, like insured farmers' personal information, farm information, farm logs, reports and shapefiles containing farm location, will be generated via the platform. All of these data are useful in order the BEACON services and products to function properly and provide accurate information (such as vegetation indices, damage assessment calculation, weather alerts).</p> <p>The aforementioned data will be saved in the BEACON central database.</p> |



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|  | <p>All user actions (login, logout, account creation, visits on specific parts of the platform) will be logged and kept in the form of a text file. This log will be useful for debugging purposes.</p> <p>Reports containing information on user devices (which browsers and mobile phones) as well as number of mobile downloads (taken from play store for android downloads) will be useful for marketing and exploitation purposes, as well as decisions regarding the supported browsers and operating systems.</p> <p>Furthermore, damage assessment results alongside with monetary estimation will be generated through the system. These results will be available through the Damage Assessment calculator and will be saved in the BEACON central database. Only the insurers will be able to view these results.</p>  |
| <p>Making data findable, including provisions for metadata</p> | <p>The data will not be directly accessible from outside. These data will be neither available to third parties nor discoverable and accessible to the public, since the level of dissemination of the respective deliverables D4.2 First version of the BEACON toolbox and D4.5 Final version of the BEACON toolbox is confidential.</p> <p>The naming convention used is: Data_WP4_2_BEACON platform.</p> <p>Every action on the platform will produce meaningful metadata such as time and date of data creation or data amendments and owners of actions that took place as well as damage assessment calculations and risk types will be saved along with the inspection results to enhance the discoverability of the results.</p> <p>The database will not be discoverable to other network machines operating on the same LAN, VLAN with the DB server or other networks. Therefore, only users with access to the server (BEACON technical team members) will be able to discover the database.</p> |
| <p>Making data openly accessible</p>                           | <p>Only registered users and administrators have access to the data. The data produced by the platform are personal data and will not be shared with others without the user's permission. No open data will be created as part of BEACON.</p>   |



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|                           | The database will only be accessible by the authorized technical team.   |
| Making data interoperable | N/A  |
| Increase data re-use      | <p>BEACON may be integrated with third parties applications, currently being used by the insurance companies, in order to re-use information already inserted in those systems.</p> <p>Moreover, the language of the content and data will be in the pilot languages.</p> <p>The raw data will not be publicly available.</p>  |
| Allocation of resources   | Resources have been allocated according to the project plan and WP4 allocated resources. No additional costs are foreseen for making this dataset FAIR.  |
| Data security             | <p>All platform generated data will be saved on the BEACON database server. Encryption will be used to protect personal user data like emails and passwords. All data will be transferred via SSL connections to ensure secure exchange of information.</p> <p>If there is need for updates, the old data will be overwritten and all actions will be audited in detail and a log will be kept, containing the changed text for security reasons. The system will be weekly backed up and the backups will be kept for 3 days. All backups will be hosted on a remote server to avoid disaster scenarios.</p> <p>All servers will be hosted behind firewalls inspecting all incoming requests against known vulnerabilities such as SQL injection, cookie tampering and cross-site scripting. Finally, IP restriction enforces the secure storage of data.</p> <p>AgroApps pays special attention to security and respects the privacy and confidentiality of the users' personal data by fully complying with the applicable national, European and international framework, and the European Union's General Data Protection Regulation 2016/679. Moreover, "Personal Data Protection Policy " and "Terms and Conditions" have been included in the BEACON, in order to inform the</p> |



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|                 | <p>users of how BEACON collects, processes, discloses and protects the incoming information.</p> <p>The BEACON platform will not keep personal data and other information after the end of the project.</p> |
| Ethical aspects | All the generated data will be protected and will not be shared without user’s consent.   |
| Other issues    | N/A   |

4.4.3. Blockchain

| DMP Component   | Issues to be addressed   |
|---|--|
| Data Summary  | <p>The Blockchain components do not collect data on their own, they only process data which have been collected/ generated in other parts of the BEACON toolchain.</p> <p>The Blockchain component will re-use data from other parts of the BEACON toolchain, especially:</p> <ul style="list-style-type: none"> <li>⊗ pesudonymised client data according to GDPR</li> <li>⊗ parcel/ field data</li> <li>⊗ contract data</li> <li>⊗ weather data</li> </ul> <p>The exact scope of data to be used depends solely on the supported insurance products which will be useful for the insurance companies and their clients.</p> <p>In general, only small portions of data will be processed on chain.</p> |
| Making data findable, including provisions for metadata | <p>Registered users will be able to discover the data stored in the Blockchain corresponding to the insurance products and will be identifiable via business process identifiers.</p> <p>Meaningful metadata will be produced as a result of every transaction such as transaction hash, block number and timestamp.</p> <p>Clear version numbers are provided via semver (semantic versioning).</p> <p>The naming convention used is:<br/>Data_WP4_3_Blockchain</p>   |



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| Making data openly accessible | <p>The Blockchain component will be run as private, permissioned chain.</p> <p>The data will be stored on blockchain, a distributed ledger. All data will be replicated over all participating nodes. For the private, permissioned chain that means that a closed group of validating nodes exist, which mine blocks and validate transactions. Further nodes can enter the network and read the distributed ledger.</p> <p>The Blockchain data will be accessed:</p> <ul style="list-style-type: none"> <li>④ in raw form via blockchain nodes</li> <li>④ in readable form via special services and API calls</li> <li>④ optional: via specialized applications which read API and offer a visual representation.</li> </ul> |
| Making data interoperable     | N/A  |
| Increase data re-use          | The data will be available for re-use only for the registered users in the BEACON toolbox.   |
| Allocation of resources       | Resources have been allocated according to the project plan and WP4 allocated resources. No additional costs are foreseen for making this dataset FAIR.  |
| Data security                 | <p>All data will be stored anonymized in the private Blockchain.</p> <p>Etherisc pays special attention to security and respects the privacy and confidentiality of the users' personal data by fully complying with the applicable national, European and international framework, and the European Union's General Data Protection Regulation 2016/679.</p>  |
| Ethical aspects               | N/A  |
| Other issues                  | N/A  |

4.4.4. Maps produced by the EO and meteorological models

| DMP Component | Issues to be addressed   |
|---------------|--|
| Data Summary  | One of the main offerings of BEACON is the generation of maps, based on EO and meteorological models and |



### D1.3 Data Management Plan

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|   | <p>on climatology service, that can help insurers to increase their efficiency.</p> <p>The geolocation metadata, for each type of map produced by each service (monitoring, damage assessment and climatology) will be produced and be depicted in the map as layers.</p>  |
| Making data findable, including provisions for metadata | <p>Registered insurers will be able to discover maps corresponding to the farms of their clients. Farmers that will be provided with access to the mobile application by the insurer will have access to the monitoring map with regards to their insured farm.</p> <p>Meaningful metadata will be produced as a result of every action (time and data of data creation or data amendments, actions that took place, service that produced the map, crop type of depicted farm).</p> <p>The naming convention used is: Data_WP4_4_Maps</p> |
| Making data openly accessible                           | <p>Maps that will be produced will not be openly accessible. Users must sign in in order to access the produced maps.</p> <p>The maps and the metadata will be made available for use by the BEACON applications through the secure API that has been created.</p> <p>The raw data, used for the generation of the maps' layers, that will be stored in the BEACON database will be only accessible by the authorised technical team.</p>  |
| Making data interoperable                               | N/A  |
| Increase data re-use                                    | <p>Maps that will be produced during the project will be offered to anyone who requests them. After the completion of the project, these data will only be available to users who will buy the product.</p>  |
| Allocation of resources                                 | <p>Resources have been allocated according to the project plan and WP4 allocated resources. No additional costs are foreseen for making this dataset FAIR.</p>   |
| Data security   | <p>All data generated by the platform will be saved on the saved on the BEACON server. All data will be transferred via SSL connections to ensure secure exchange of information.</p>  |



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|                 | <p>In case of necessary updates, the old data are overwritten and all actions are audited in detail and a log is kept, containing the changed text for security reasons. Daily backups for a period of 3 days are kept. All backups are hosted on a remote server to avoid disaster scenarios.</p> <p>All servers are hosted behind firewalls inspecting all incoming requests against known vulnerabilities such as SQL injection, cookie tampering and cross-site scripting. Finally, IP restriction enforce the secure storage of data.</p> <p>AgroApps pays special attention to security and respects the privacy and confidentiality of the users' personal data by fully complying with the applicable national, European and international framework, and the European Union's General Data Protection Regulation 2016/679.</p> |
| Ethical aspects | N/A   |
| Other issues    | N/A   |

### 3.4. DMP Components in WP5 – Creating Business Experience & BEACON Accreditation path (KARAVIAS)

| DMP Component | Issues to be addressed   |
|---------------|--|
| Data Summary  | <p>The purpose of the WP5 data is to identify all needs for the pilot implementation, to define the specifications of each pilot case and to perform the pilots testing in an operational environment. Furthermore, the WP5 data will serve to improve and further validate the services and delivery the final BEACON toolbox.</p> <p>Mainly and if it is possible, it will be used online and/or electronic archives. The main documents and formats that will be used in order to collect and generate the necessary data will be templates agreed in the D5.1 Pilot plan and evaluation methodology.</p> <p>Semi-structured interviews with participants will be collected and stored using digital recording (e.g. MP3) only if it is allowed by the interviewees. In case of</p> |





### D1.3 Data Management Plan

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|   | <p>denial, interview notes will be kept with regards to agreed formats and standards.</p> <p>All data will be in doc./ docx and pdf format.</p> <p>These data collection will be only used for the evaluation of the BEACON services and the definition or potential recommendations for the BEACON toolbox improvements.</p>  |
| Making data findable, including provisions for metadata | <p>The raw data collected in WP5 will not be made publicly available as it might include confidential and personal data.</p> <p>Not even the results derived from these data process will be made publicly available since the dissemination level of the respective deliverables (D5.3 Pilot data validation report and D5.4 Validation report) is confidential.</p> <p>The naming convention used is: Data_WP5_1_Evaluation data.</p> <p>No metadata will be generated</p> |
| Making data openly accessible                           | <p>All raw data collected in WP5 will be for internal use within the project consortium. As these data might contain personal data, the databases will not be publicly available.</p> <p>The data will be stored on KARAVIAS servers.</p>  |
| Making data interoperable                               | N/A  |
| Increase data re-use                                    | <p>The data of WP5 will be collected and generated in M13 and all specifications and periods of use and re-use will be established in D5.1 Pilot plan and evaluation methodology.</p> <p>However, data that will be collected and processed during this WP will be exclusively for analytical and statistical purposes and will not be re-used.</p>  |
| Allocation of resources                                 | <p>Resources have been allocated according to the project plan and WP5 allocated resources. No additional costs are foreseen for making this dataset FAIR.</p>   |
| Data security   | <p>The data will be collected for internal use in the project and not intended for long-term preservation. The data will be stored on KARAVIAS server. KARAVIAS fully</p>  |



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|                 | complies with the applicable national, European and international framework, and the European Union's General Data Protection Regulation 2016/679.                        |
| Ethical aspects | A Privacy Policy document will be prepared specifying the main purpose of the data collected and/ or generated within WP5 and how these data will be treated and by whom. |
| Other issues    | N/A   |

### 3.5. DMP Components in WP6 – BEACON Commercialisation Playbook and Growth Hacking (INOSENS)

| DMP Component | Issues to be addressed  |
|---------------|---|
| Data Summary  | <p>The purpose of data collection in WP6 is to support commercialization of the BEACON toolbox, to define the business models for sustainable growth and to attract attention of global Agricultural Insurance (AgI) players engaging them in the BEACON development.</p> <p>The data that will be collected and/ or generated within WP6 will represent the foreground knowledge, derived from the experienced based on the project implementation and the intangible data and results of the project, such as: business modeling information, outcomes, know-how, etc.</p> <p>Specifically, all partners will provide input with regards to the critical KPIs of the growth hacking activities as well as for the Business Plan and Market Analysis. This dataset includes the following details:</p> <ul style="list-style-type: none"> <li>④ Market analysis</li> <li>④ Competitive analysis</li> <li>④ Business proposition</li> <li>④ Service value chain</li> <li>④ Identification of economic and non-economic risks</li> <li>④ BEACON Business canvas</li> <li>④ Roadmap for service implementation and exploitation</li> <li>④ Marketing, Dissemination and exploitation</li> </ul> |



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|  | <p>Moreover, contact details of LHC along with the Letter of Support (LoS) side from their side are kept in AgroApps server. Contact details of potential LHC are also kept in the AgroApps server (for further expansion of the LHC group). The contact details data are stored in a simple table (excel format) with the following fields:</p> <ul style="list-style-type: none"> <li>📍 Company Name</li> <li>📍 Country</li> <li>📍 Contact Person</li> <li>📍 E-mail</li> <li>📍 Phone number</li> <li>📍 First contact via email (date)</li> <li>📍 Follow up via email (date)</li> <li>📍 Call (date)</li> <li>📍 Status (LHC, Pending, Not interested)</li> <li>📍 Result/ Comment</li> </ul> <p>Furthermore, interviews have been conducted with the LHC in order to inform them about the project status and progress and explore their involvement and contribution into the project. Most interviews and webinars will be conducted remotely either using Skype or Gotomeeting.</p> <p>The expected size of the data is not applicable, as the size is not a meaningful measure. Up to now, 40 interviews have been conducted.</p> |
| <p>Making data findable, including provisions for metadata</p> | <p>The data with regards to the interviews with the LHC and the LoS data are stored on AgroApps server and are not directly accessible from outside. Moreover, these data will be neither available to third parties nor discoverable and accessible to the public, since the level of dissemination of the respective deliverables D6.8 Lighthouse Customers Group, D6.9 Lighthouse Customers Group (2) and D6.10 Lighthouse Customers Group (3) is confidential.</p> <p>The naming convention used is: Data_WP6_1_LHC</p> <p>Regarding the input provided for the Business Plan and Market Analysis as well as for the growth hacking activities, these data will be neither available to third parties nor discoverable and accessible to the public,</p>   |



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|                               | <p>since the level of dissemination of the respective deliverables (D6.2, D6.3 and D6.4 Report of Growth hacking activities and D6.11, D6.12 and D6.13 Business models and go-to-market strategy) is confidential.</p> <p>The naming conventions used are:</p> <ul style="list-style-type: none"> <li>🌐 Data_WP6_2_Growth hacking activities</li> <li>🌐 Data_WP6_3_Business Plan</li> <li>🌐 Data_WP6_4_Market Analysis</li> </ul> <p>No metadata will be generated.</p> |
| Making data openly accessible | The datasets will not be publicly available. Only the partners have access to the data through the dropbox folder.  |
| Making data interoperable     | N/A   |
| Increase data re-use          | N/A   |
| Allocation of resources       | Resources have been allocated according to the project plan and WP6 allocated resources. No additional costs are foreseen for making these datasets FAIR.   |
| Data security                 | <p>All the data are saved on the InoSens (WP leader) and AgroApps servers.</p> <p>InoSens and AgroApps pay special attention to security and respects the privacy and confidentiality of the users' personal data by fully complying with the applicable national, European and international framework, and the European Union's General Data Protection Regulation 2016/679.</p>  |
| Ethical aspects               | N/A   |
| Other issues                  | InoSens applies ISO 9001 standard within the organization structure of the company, which acquires the data management procedures for improvement of data quality across data collection system. From the national regulations, InoSens will follow the rules of Law on data security – Republic of Serbia.   |

### 3.6. DMP Components in WP7 – Dissemination, Communication and Diffusion of BEACON (CREVIS)



| DMP Component       | Issues to be addressed   |
|---------------------|--|
| <p>Data Summary</p> | <p>The aim of the data collected and/ or generated within WP7 is to develop and implement an effective dissemination, exploitation and communication strategy as well as to attract and engage as many AgI enablers as possible, establishing an interactive Advisory Board (AB).</p> <p>The AB members data is described by the following fields (in excel format):</p> <ul style="list-style-type: none"> <li>⊗ Name</li> <li>⊗ Description</li> <li>⊗ Affiliation</li> <li>⊗ Organisation</li> <li>⊗ Country</li> <li>⊗ Proposed by</li> </ul> <p>Interviews have been conducted with the AB members and webinars will be held in order to inform them about the project status and progress. Most interviews and webinars will be conducted remotely either using Skype or Gotomeeting.</p> <p>The expected size of the data is not applicable, as the size is not a meaningful measure. Up to now, 4 interviews have been held.</p> <p>Furthermore, all the partners provide reports with regards to the dissemination activities they have performed.</p> <p>Personal data of newsletter subscribers will be collected, such as:</p> <ul style="list-style-type: none"> <li>⊗ Email address</li> <li>⊗ First name</li> <li>⊗ Last name</li> <li>⊗ Organisation</li> <li>⊗ Country</li> </ul> <p>Personal data of the BEACON website users requesting for further information through the Contact Form, such as:</p> <ul style="list-style-type: none"> <li>⊗ Name</li> <li>⊗ Email</li> <li>⊗ Subject</li> </ul> |



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| <p>Making data findable, including provisions for metadata</p> | <p> Message</p>   |
|  | <p>The data with regards to the interviews of the AB and the contact details are stored on CREVIS server and will not be directly accessible from outside. Moreover, these data cannot be made available to third parties. However, the interviews will be available in D7.4 “Agricultural Ins. Enablers” – Advisory Board report, D7.5 “Agricultural Ins. Enablers” – Advisory Board report (2), D7.6 “Agricultural Ins. Enablers” – Advisory Board report (3) and D7.7 “Agricultural Ins. Enablers” – Advisory Board report (4). The dissemination level of these deliverables is public and they are available in the project’s website and in Zenodo through the DOI:</p> <p> D7.4 “Agricultural Ins. Enablers” – Advisory Board report: DOI: 10.5281/zenodo.3339150</p> <p>The naming convention used is: Data_WP7_1_Advisory Board</p> <p>Regarding the input for the dissemination activities, the data are also stored on CREVIS servers and are not directly accessible from outside. These data will be presented in the respective deliverables (D7.2, D7.3 BEACON promotional activities and engagement report), which are publicly available either through the project website or through Zenodo.</p> <p>The naming convention used is: Data_WP7_2_Promotional and engagement activities</p> <p>The general approach regarding the DEC activities and plan is presented in the respective deliverable D7.1 Dissemination, Exploitation and Communication and is accessible through the BEACON website and Zenodo with the following DOI:</p> <p> D7.1 Dissemination, Exploitation and Communication: DOI: 10.5281/zenodo.3339140</p> <p>The naming convention used is: Data_WP7_3_DEC</p> <p>As part of any stored data, metadata will be generated, which will include sufficient information with appropriate keywords to help external and internal users to locate data and related information.</p> |



|                                      |   |
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|                                      | <p>With regards to the newsletter subscribers, the data are stored in the BEACON website database and are not directly accessible from outside. These data will not be presented in any report or deliverable but an indicator (the sum of the subscribers) will be presented in the respective reports. The same approach will be followed with the data collected from the Contact Form.</p> <p>The name conventions used are:</p> <ul style="list-style-type: none"> <li>🌐 Data_WP7_4_Newsletter subscribers</li> <li>🌐 Data_WP7_5_Contact form</li> </ul> <p>No metadata will be generated.</p> |
| <p>Making data openly accessible</p> | <p>The datasets are not publicly available.</p> <p>All the data will be made publicly available as part of the aforementioned deliverables and can be accessed and re-used by third parties indefinitely without any restrictions.</p>  |
| <p>Making data interoperable</p>     | <p>N/A</p>  |
| <p>Increase data re-use</p>          | <p>Data are publicly available as part of the aforementioned deliverables and can be accessed and re-used by third parties indefinitely without any restrictions.</p>   |
| <p>Allocation of resources</p>       | <p>Resources have been allocated according to the project plan and WP7 allocated resources. No additional costs are foreseen for making this dataset FAIR.</p>  |
| <p>Data security</p>                 | <p>All data collected data will be saved on BEACON website database.</p> <p>CREVIS fully complies with the applicable national, European and international framework, and the European Union's General Data Protection Regulation 2016/679. Moreover, "Privacy Policy" and "Terms and Conditions" have been included in the BEACON website, in order to inform the users of how BEACON collects, processes, discloses and protects the incoming information.</p>  |
| <p>Ethical aspects</p>               | <p>N/A</p>  |



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|--------------|-----|
| Other issues | N/A |
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