

## D4 Best Practice Roadmap

# EO Best Practice – Agro-Insurance

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08 September 2020

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Prepared for:  
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**EO Best Practice – Agro-Insurance**

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## Table of Content

<b>1</b>	<b>Why do we need a roadmap?</b>	<b>6</b>
1.1	<i>Earth Observation Best Practice for Agro-Insurance</i>	6
1.2	<i>Agro-insurance</i>	7
1.3	<i>EO in support of addressing key challenges</i>	8
<b>2</b>	<b>Where are we now?</b>	<b>10</b>
2.1	<i>Summary of relevant EO satellites</i>	10
2.2	<i>EO product portfolio</i>	10
<b>3</b>	<b>Where do we want to be?</b>	<b>12</b>
3.1	<i>Key Geo-information Requirements</i>	12
3.2	<i>Gap Analysis</i>	13
3.3	<i>Future Capabilities</i>	13
<b>4</b>	<b>How do we get there?</b>	<b>15</b>
4.1	<i>Future Activities</i>	15
4.2	<i>Guideline</i>	18
4.3	<i>Description of work</i>	19
<b>5</b>	<b>Conclusions</b>	<b>25</b>

## List of Figures

Figure 1: Project logic..... 6  
Figure 2: Agro-insurance’s business processes..... 8  
Figure 3: Opportunities for the EO technology within the agro-insurance sector. .... 9

## List of Tables

Table 1: Overview table of identified key geo-information requirements..... 12  
Table 2: Summary of proposed activities..... 17

# 1 Why do we need a roadmap?

## 1.1 Earth Observation Best Practice for Agro-Insurance

The Earth Observation Best Practice for Agro-Insurance (EO4I) project brings together both sectors, the EO as well as the agro-insurance’s sector, to find out more about agro-insurance’s needs and how these might be addressed currently and/or in the future with EO capabilities.

EO Best Practice are user-oriented projects, thus the requirements of the users have a central focus. To find out about the needs and capabilities, the project involves three key industry partners from this sector: the Austrian Hail, Swiss Hail and Vereinigte Hagel – together forming the ASV working group. Several surveys, workshops and user meetings with the working group as well as with other first and re-insurances now form the basis for this document, the best practice roadmap for the use of EO data by the agro-insurance sector.

Based on the identified needs of the agro-insurances (D1.2 Geoinformation Requirements Report), the current EO capabilities that fit those needs were defined (D2.1 EO Capabilities Report), as shown in Figure 1. Furthermore, existing gaps between the needs and the capabilities were identified and how these might be addressed in the coming years considering future missions, new data sources and technologies (D2.2 Gap Analysis Report). The outcomes of those activities lead into this roadmap which establishes recommendations and strategies for potential future uptake and development of identified insurance’s challenges and requirements and existing EO gaps.

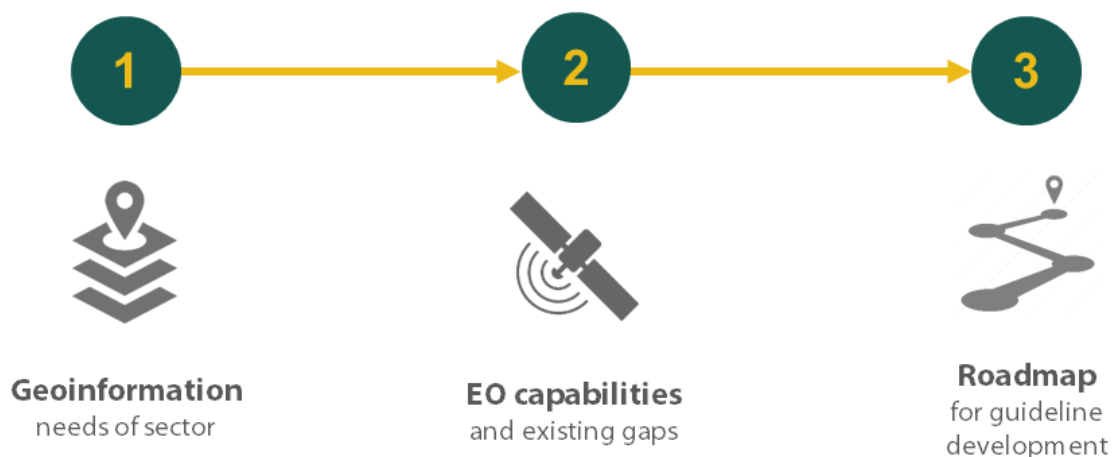


Figure 1: Project logic.

The next chapters provide the key findings of the performed activities which serve as starting point for the final chapter. The final chapter provides a guideline on proposed future activities. Based on the roadmap that was developed in a similar project<sup>1</sup>, four questions guide through this document:

<sup>1</sup> Geo-Cradle. Roadmap for the future implementation of GEOSS and Coperincus in the Balkans, Middle East and North Africa regions. [http://geocradle.eu/wp-content/uploads/2016/07/D5.7-Roadmap-for-future-implementation\\_v13.pdf](http://geocradle.eu/wp-content/uploads/2016/07/D5.7-Roadmap-for-future-implementation_v13.pdf)

- **Why do we need a roadmap?**

This current introducing chapter provides a short introduction to the project aim as well as the activities performed throughout the project's lifetime which serve as input for this roadmap.

- **Where are we now?**

This chapter focuses on existing EO capabilities.

- **Where do we want to be?**

Here, the key challenges and requirements of the agro-insurances are addressed as well as the gaps which were identified to see what should be addressed in the future to better meet the needs of the agro-insurances.

- **How do we get there?**

The final chapter provides all proposed future activities as well as a guideline with defined workpackages how a potential uptake in the agro-insurance's sector might look like in the future.

## 1.2 Agro-insurance

Agriculture provides essential social benefits: supply of food and commodities, economic development and employment. About 37% of Earth's land surface is employed for agricultural purposes, about 11% of it used for growing crops and the other 26% for pasture. In turn, agriculture is under growing pressure arising from increased productivity requirements, soil erosion and sealing, water scarcity, effects of various natural hazards and weather extremes due to changes in climate patterns.

Earth observation is a powerful technique used to continuously provide geospatial information across the agricultural value chain, measure productivity and increase in efficiency of agriculture, identify sustainability of farming practices and strengthening the resilience of rural communities. Satellites can be applied to agriculture in several ways, initially as a means of estimating crop biomass and potential yields. Optical and radar sensors can provide an accurate picture of the acreage being cultivated, while also differentiating between crop types and determining their health and maturity. The satellites can be used to discover and monitor impacts of extreme weather events on this sector.

Agricultural insurance is likely to have an increasing role as a risk management tool in arable crops, horticulture and livestock farming. Several common forms of insurance for the agricultural sector can be distinguished: indemnity-based, yield-based and index-based structures. Hail Insurance and the Multi-Peril Crop Insurance (MPCI) are often either indemnity-based or yield-based products.

Only in recent decades, new insurance solutions have been developed that do not only cover crop loss due to hail, but also warn farmers before and support them after natural hazards against other natural hazards. Changes in climatic patterns increase yield losses due to higher frequency and severity of extreme natural events forces, which pushes the insurance sector to address the negative effects of more natural hazards covered by various insurance products.

Given this, the insurance sector has a significant emphasis on identifying, gathering and aggregating data and getting access to local and regional information, including history of losses due to effects of relevant risks that could now be sourced from remote sensing and Earth observation data.

Within this project, the following five "business processes" of the agro-insurance sector were considered, which are described in detail below:

- **Product Development**  
*Product Development is a complex of activities that insurer undertakes to develop and introduce a new insurance product on the market.*
- **Product Sales**  
*A range of activities for insurance product promotion on the market.*
- **Underwriting**  
*Selecting or rating perils for insurance purposes.*
- **Loss Adjustment**  
*Determination of the extent of damage resulting from occurrence of an insured peril.*
- **Claims Handling**  
*Processing of insured farmer’s application for indemnification due to loss of crop/yield caused by the insured peril.*

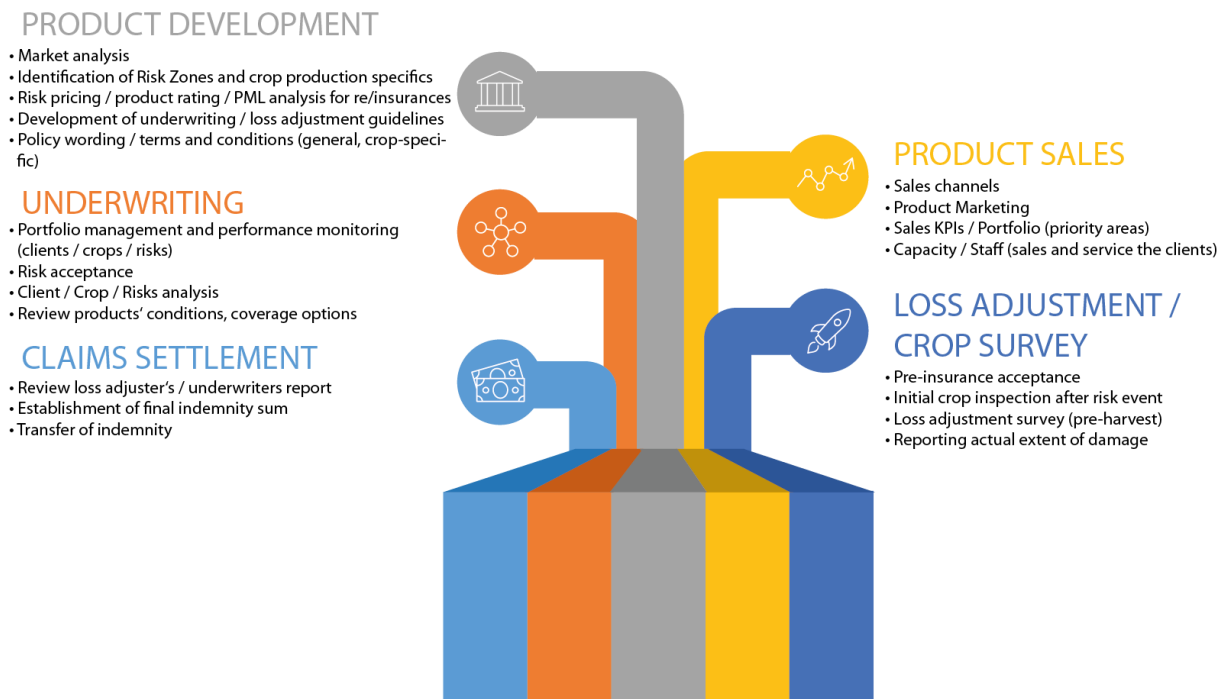


Figure 2: Agro-insurance’s business processes.

### 1.3 EO in support of addressing key challenges

Remotely sensed data are not yet being used to their full potential for insurance. One bottleneck is the lack of awareness, understanding and trust in the EO products and services for the agro-insurance sector. Three opportunities can thus be defined within this project and within the agro-insurance sector, as illustrated in Figure 3:

- Opportunity 1: Currently available EO technology which is known to be suitable for addressing particular agro-insurance requirements
- Opportunity 2: Currently available, but unrecognized EO capabilities which could give enhanced performance to the agro-insurance sector



- Opportunity 3: EO technology, not currently available, which could solve agro-insurance’s challenges

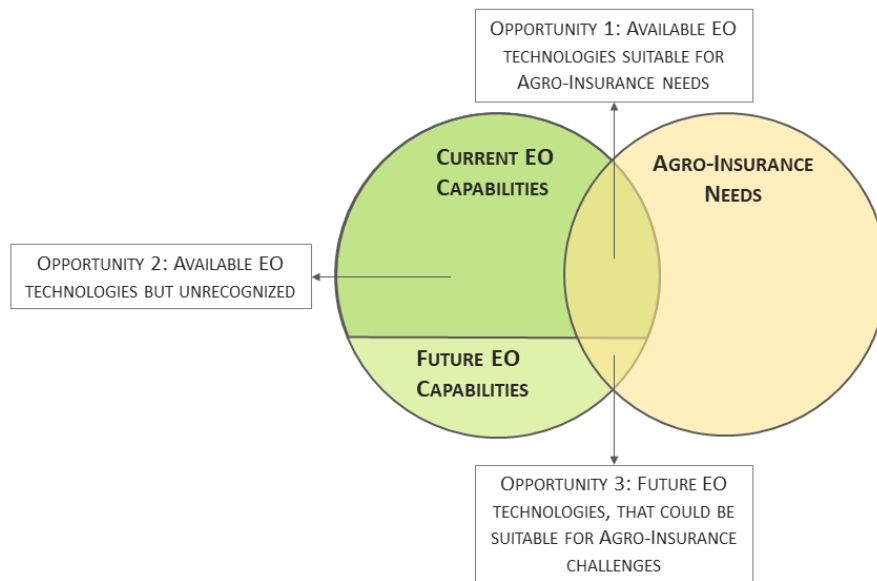


Figure 3: Opportunities for the EO technology within the agro-insurance sector.

The over-riding objective of this project was to establish a roadmap for the development of agro-insurance guidelines for the use of EO data by the agro-insurance sector. To meet this objective, it was necessary to fully understand the needs and requirements of the agro-insurance’s sector. As part of the project, already existing technologies and capabilities which address these needs were identified. However, some EO products may need some refinement to fully meet the needs of the insurances and make it a suitable support for agro-insurance products. This might be due to various reasons, such as missing technologies and methodologies or rather just finding the right format and combination of suitable EO products to fit into the existing, daily workflows of agro-insurances.

With all the information, further steps to support the challenges and needs will be defined in this report. This, however, is not meant to be a complete list of activities that will close all the gaps. The workpackages as defined in chapter 4 will serve as an outline of the next steps towards a better procurement of EO-based solutions, having the guidelines as a reference of the next steps.

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## 2 Where are we now?

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The following chapter addresses currently available EO capabilities and technologies that provide solutions to the needs of the agro-insurance sector. The requirements and challenges of the insurances were identified throughout the lifetime of the project within several meetings and workshops and will be addressed in detail in the next chapter. Based on these findings, existing EO products and technologies were identified which could contribute to the present-day sectors' geo-information needs. In reference to Figure 3, these are currently available EO technologies that are already utilized by the agro-insurance sector as well as technologies that are available but at the moment not recognized as suitable for the industry. The analysis has defined and characterized several existing and available EO-based products relevant to the sector.

### 2.1 Summary of relevant EO satellites

Currently, numerous freely and commercially available earth observation satellites are relevant and suitable for developing EO products for the agro-insurance sector. The following overview presents some of the widely used techniques.

- As part of the Copernicus program, ESA provides a range of different satellite techniques in high spatial resolution that are freely available. Sentinel-2 can be considered as the satellite with the highest impact on agro-insurance applications, providing the temporal and spatial detail required to generate crop monitoring products at the parcel level. Furthermore, the radar based Sentinel 1 is being used for operational crop monitoring, with the benefit that it is insensitive to cloud cover and hence provides continuous information. Sentinel-3 is used for broader scale landscape monitoring and to link actual observations with historical time series of predecessor satellite missions.
- NASA's Landsat mission provides the longest available archive of optical based satellite data since 1972. The current missions of the freely available data are Landsat 7 and 8.
- Optical medium resolution imagery are provided by the Proba-V satellites (the mission ends 2020, but CubeSat will continue the observations in the visible and thermal part of the spectrum); furthermore, NASA's MODIS (Moderate Resolution Imaging Spectroradiometer) mission and its successor VIIRS (Visible Infrared Imaging Radiometer Suite), covers a long archive of data with the first satellite launched in 1999 that is freely available as well.
- ESA's SMOS (Soil Moisture and Ocean Salinity satellite) satellite mission provides data with a spatial resolution of 50km and a temporal resolution of 3 days. The data is freely available since 2010. The satellite was designed to make global observations of soil moisture over land and salinity measurements over oceans.
- Furthermore, very high resolution data is available through several commercial satellite operators such as Planet Labs (PlanetScope, RapidEye, Skysat), Deimos Imaging (DEIMOS-2) and Airbus (Pléiades 1A/1B, SPOT 6/7).

### 2.2 EO product portfolio

Based on this raw data (optical, radar) provided through satellites that are freely available or can be commercially purchased, service providers process the data to provide value added information

suitable for addressing various thematic aspects. An analysis identified 21 products that are already available and address the needs and challenges of the agro-insurance sector. The technical readiness level of the earth observation products described in this report cover operational products (e.g. crop type mapping, field delineation, etc.) and products in development (e.g. early vegetation stress).

The following products were identified as services that address the needs of the insurance's:

- Biomass Production Estimation
- Crop Damage Zone Detection
- Crop Growth Zone Detection
- Crop Type Detection
- Date of Emergence
- Digital Elevation Model
- Drought Indicators
- Early Vegetation Stress
- Evapotranspiration
- Field Boundaries
- Gap Filled Time Series
- Grassland Mowing Cycle
- Greenhouse Early Warning
- Irrigation Mapping
- Monitor and Forecast Weather Events
- Near Real Time Service
- Soil Moisture
- Vegetation Growth Monitoring
- Vegetation Indices
- Water Bodies Detection
- Yield Estimation

### 3 Where do we want to be?

As mentioned before, the main objective of this project was to find a way to support the agro-insurance sector with EO data and to make those insurances aware of the EO industry and their products. To do so, it was necessary to get a current status of what agro-insurances need. What are their challenges in daily live and what are respective requirements to overcome those challenges?

This chapter summarizes the main outcomes of the requirements analysis conducted throughout the whole project lifetime as well as the identified gaps that are still existing. This directly connects to opportunity 3 as defined in Figure 3 indicating EO technology that is currently not available but could solve the agro-insurance’s challenges.

#### 3.1 Key Geo-information Requirements

In the various workshops and user meetings, 61 needs and challenges (see D1.2 Geoinformation Requirements Report), each connected to one of the five business processes, were identified. The challenges were then translated into 26 geo-information requirements that are necessary to address those challenges. The table below lists all these requirements:

Table 1: Overview table of identified key geo-information requirements.

ID	Key Geo-Information Requirement
1	Obtain uninterrupted consistent long data series (high temporal/spatial resolution)
2	Obtain detailed topographic characteristics
3	Obtain detailed imagery of the surface
4	Identify soil types (mineralogy, structural properties of near surface)
5	Identify soil moisture contents
6	Obtaining information on parcel location and boundaries
7	Identify crop type
8	Obtain historical crop production (crop, area, yields)
9	Crop vegetation monitoring
10	Monitoring stress in vegetation
11	Identify the crop emergence and harvest date
12	Crop yield monitoring
13	Estimating yield losses
14	Identify crop damages
15	Identify effects of various risks (frequency, severity, area covered by each risk event)
16	Obtain detailed land use information (crop production landscape, etc.)
17	Identifying agricultural practices (irrigation, fertilisation)

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18	Obtain detailed imagery of assets (property, machinery, other field infrastructure)
19	Identify location and condition of infrastructure objects (irrigation, greenhouses, water wells, etc.)
20	Identify water boundaries (flooded areas, etc.)
21	Identify livestock movements
22	Identify pastures biomass (yield potential)
23	Identify waves height, currents' energy and thermal data
24	Identify water flora/fauna (algae, etc.)
25	Identify forests characteristics (area, boundaries, timber type, etc.)
26	Monitor and forecast weather events

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### 3.2 Gap Analysis

Finally, a gap analysis was performed to identify, whether the agro-insurance's challenges and key geo-information requirements can be met with the current EO capabilities and to identify current limitations.

It could be seen that most of the requirements have corresponding EO products. At a thematic level, these requirements can be met at the moment. However, to really assess gaps, a close look at the related business processes of the agro-insurances and a detailed look at their challenges is necessary to see whether the insurance's needs can be met. For example, the EO product "crop type mapping" matches the requirement "identify crop type". However, the timing of detection is very relevant for insurance's purposes, since they need this information very early in the season, even before the emergence of the crop. To produce such a product at the needed level of certainty, this cannot be met with current EO techniques.

Furthermore, an EO product might be thematically fitting into the agro-insurance's challenges and needs. However, this does not mean that the products already fit into their workflows. Also often a combination of EO products is necessary to support insurances. Therefore, an assessment on how the EO products can be adapted and improved needs to be done.

### 3.3 Future Capabilities

In a further step, the analysis closely looked at future planned and candidate missions that might address these gaps in the coming years. Several planned missions were identified:

- ESA plans follow-up missions for the Sentinel satellite including radar and optical imagery which are useful for a range of various requirements.
- The BIOMASS satellite is planned for launch in 2023 by ESA. The data will be interesting for global forest biomass measurements.
- With a planned launch in 2023, ESA's FLEX (Fluorescence Explorer) mission will provide global estimated of vegetation fluorescence, photosynthetic activity and vegetation stress.
- NASA's Landsat 9 mission is scheduled for launch in 2023 and will continue the long time series of the Landsat legacy.

Furthermore, some ESA's candidate missions might contribute to the needs of the agro-insurances:

- The CHIME (Copernicus Hyperspectral Imaging Mission) mission will deliver information on soil and improve the mapping of species.
- LSTM (Copernicus Land Surface Temperature Monitoring) mission will provide information on evapotranspiration on parcel level. This could be especially useful for early stress detection, irrigation mapping and drought analysis.
- Relevant information for soil moisture estimated on parcel level will be provided by the ROSE-L (L-band Synthetic Aperture Radar) mission.

## 4 How do we get there?

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Based on the identified future activities (4.1), the resulting upcoming tasks and activities will now be translated into a roll-out strategy and a more detailed description of the related work. This works as a guideline for a potential uptake to further expand the work already conducted within this project's lifetime and includes recommendations and strategies for future work.

### 4.1 Future Activities

This section identifies the actions required by ESA to encourage the adoption of EO in the agro-insurance sector. It highlights why particular activities are proposed as potential tasks for further uptake. The identified actions contribute to the following aspects:

- Demonstrate value for a potential uptake of EO within the agro-insurance sector
- Enable utilisation of EO solutions by the agro-insurance sector
- Communication to increase the visibility of EO within the agro-insurance's sector
- Identify opportunities beyond this project's focus

#### **Demonstrate value for a potential uptake of EO within the agro-insurance sector**

*Current project activities prioritized the identification of future possibilities and opportunities for the EO industry. Soon it became clear that available EO products need to be adapted into agro-insurance solutions to fit into the daily workflows of insurers ('From EO products to insurance solutions'). It is important to demonstrate that EO can provide suitable and valuable solutions for the sector ('Development of new products, i.e. agro-insurance solutions').*

#### **ACTIVITY 1: From EO products to insurance solutions**

A majority of the sector is quite well aware of available EO products/services and example usages for agro-insurances. There is however a gap between the perceived capabilities of EO services which are often generic and the sector's specific needs. The activities of this project identified EO products that thematically match the needs of the agro-insurance's challenges and needs; however, for the future it is important to take a closer look at current workflows and products of the insurances to develop solutions that perfectly fit into the daily life and can best be used by the insurances.

#### **ACTIVITY 2: Development of new EO products, i.e. agro-insurance products / solutions**

Depending on the agro-insurance business process, the conducted survey showed that between 10%-30% of the consulted companies already use EO in an operational way. But most of the usage is still in experimental or pilot phase. Developing new products, support of field work, providing objective information and obtaining spatial information that is not available from another source, were considered as the main motivations to start using EO for agro-insurances. Additionally, currently available EO products do not directly fit into the purposes of the agro-insurances. The current activities of the project were rather focused on a theoretical basis to identify the potential and opportunities for both, the EO and the agro-

insurance sector. The development of case studies would be therefore the next step to demonstrate the potential of EO.

### **Enable utilisation of EO solutions by the agro-insurance sector**

*Agro-insurances are sometimes not aware of existing EO capabilities that might be suitable for their purposes. Therefore, it is important to increase the visibility ('Increase visibility within the agroinsurance's sector'). It was also noticed that sometimes there is a lack of knowledge for the techniques and usability of EO products, services and solutions ('Provide training and support').*

#### **ACTIVITY 3: Increase visibility within the agro-insurance's sector**

The agro-insurance sector has evolved significantly over the past years, in terms of the number of products they offer, but also in the number of farmers insured. The increased complexity of the products/services and number of fields that need to be assessed after a peril are determining the sectors growing geo-information needs. However, during the project activities it became clear that the agro-insurance sector is generally fairly good updated on the existence of EO products. Nevertheless they perceive those possibilities as not fitting their purposes and requirements. Insights in the product characteristics such as timeliness, accuracy, etc. and the step from EO product to service need to be elaborated much more clearly. EO needs to move to the agro-insurance sector and adapt its products and needs to reach out to the agro-insurance sector and promote those adapted products. Therefore, dissemination and outreach activities to increase the visibility of EO solutions within the agro-insurance's sector are highly recommended.

#### **ACTIVITY 4: Provide training and support**

In terms of using imagery and platforms, right now restrictions from a technical and IT side exist. It would be helpful to know what infrastructure is needed and further technical requirements as well as to have a good documentation and a (technical) user support to handle the data easier. Therefore, providing workshop and training on EO in general but also the usage of the products and services would be a further step towards improving the usability of EO based agro-insurance solutions.

### **Communication to increase the visibility of EO within the agro-insurance's sector**

*Current activities and future efforts can only be effective if they are well communicated, therefore existing capabilities should be publicised ('Enhance EARSC working area'), as well as industry-related workshops, conferences and meetings ('Increase visibility within the agro-insurance's sector').*

#### **ACTIVITY 5: Enhance EARSC working area**

The EARSC working area, that has been established and used for review, discussion and documentation during the EO4I project, should be extended beyond the project's lifetime to disseminate relevant information. The already established working area on the EARSC portal might be expanded and updated on a regular basis to make resources widely available, including an update of EO capabilities.



**Identify opportunities beyond this project’s focus**

*Current project activities mainly focused on First Insurers. However, there are other stakeholders that need to be taken into account (‘Requirements of Reinsurances’, ‘Additional Stakeholders’). Furthermore, new opportunities might come up, especially with regard to the current Covid-19 pandemic (‘New Opportunities’).*

**ACTIVITY 6: Requirements of Reinsurances**

The current project focused mainly on the needs, challenges and requirements of First Insurances. During the project activities, at the second workshop in Innsbruck, the user group was widened and Reinsurances were invited as well. The discussions showed that there is also a strong need for EO services in the Reinsurance’s sector and that the needs from First and Re-Insurances can be quite different but still interdependend. As this was not covered in the current activities, this should be addressed in upcoming activities.

**ACTIVITY 7: Additional Stakeholders**

The project strongly focused on the interests of First Insurers. However, there might be additional stakeholders connected to the agro-insurance sector that already use or might use EO products and services in the future. An analysis to engage complementary industry bodies could open future collaboration opportunities.

**ACTIVITY 8: New Opportunities**

Following the impact of the global Covid-19 pandemic a more thorough analysis of the immediate impact on business processes is required, ongoing technology shift towards web-based solutions should be considered, also including possible high-quality solutions benefitting insurers’ business processes from the latest AI-based EO technologies. Therefore, to conduct a more thorough analysis of the immediate impact of COVID-19 on business processes could open new opportunities.

*Table 2: Summary of proposed activities.*

Activity		Short description
1	From EO products to insurance solutions	Identify solutions that perfectly fit into the daily life and can best be used by the insurances
2	Development of new EO products, i.e. agro-insurance products / solutions	Develop case studies to demonstrate the business case of EO at both an organisational and asset level
3	Increase visibility within the agro-insurance’s sector	Obtain uninterrupted consistent long data series (high temporal/spatial resolution)
4	Provide training and support	Offer training and support to increase usability of EO products within the agro-insurance sector

5	Enhance EARSC working area	Make concise supporting resources widely available, including an update of EO capabilities
6	Requirements of Reinsurances	Analyse the geo-information requirements of Reinsurances
7	Additional Stakeholders	Engage complementary industry bodies to identify collaboration opportunities
8	New Opportunities	Analyse the geo-information requirements with regard to the Covid-19 pandemic

## 4.2 Guideline

Based on the identified future activities, the proposed tasks have been segmented into the following three groups:

- Strategically important activities to increase useability of EO products within the agro-insurance sector
- Short-term activities to broaden the knowledge of challenges and requirements for a potential uptake
- Supporting activities to raise awareness and gain visibility within the agro-insurance’s sector

The division of activities should give a guideline to see which activities can be performed within a shorter and a longer time period as well as the importance of the activities. Each of the above-mentioned tasks is now linked to one of these groups.

### **Strategically important activities to increase useability of EO products within the agro-insurance sector:**

*Activities that are very important to realise the increased adoption of EO in the agro-insurance sector but typically span longer time periods.*

- ACTIVITY 1: From EO products to insurance solutions
- ACTIVITY 2: Development of new EO products, i.e. agro-insurance products/ solutions

### **Short-term activities to broaden the knowledge of challenges and requirements for a potential uptake:**

*Activities that can be achieved within a short time frame. Typically, they are important to identify potential future activities but not critical to encouraging the adoption of EO.*

- ACTIVITY 6: Requirements of Re-Insurances
- ACTIVITY 7: Additional Stakeholders
- ACTIVITY 8: New Opportunities

**Supporting activities to raise awareness and gain visibility within the agro-insurance’s sector:**

*Activities that in isolation are unlikely to encourage a step change in the adoption of EO in the agro-insurance sector, but in conjunction with strategically important measures would be of value.*

- ACTIVITY 3: Increase visibility within the agro-insurance’s sector
- ACTIVITY 4: Provide training and support
- ACTIVITY 5: Enhance EARSC working area

**4.3 Description of work**

The following tables provide a detailed description for each of the identified activities. The description for each proposed activity includes the following aspects:

- **Objectives**  
*Why do we consider this activity as important?*
- **Tasks**  
*Which tasks need to be performed to pursue this activity?*
- **Targets/output**  
*What is the goal of this activity?*  
*What will be the expected outcome(s)?*
- **Expected efforts**  
*What time is expected to complete the activity?*  
*The expected efforts are categorized as follows:*
  - *SHORT TERM: < 6 months*
  - *MID TERM: 6-12 months*
  - *LONG TERM: > 12 months*
- **Cost estimates**  
*What cost frame do we expect to complete the activity?*  
*The expected cost frames are categorized as follows:*
  - *LOW COST: < EUR 100.000*
  - *MEDIUM COST: 100.000 – 500.000*
  - *HIGH COST: >500.000*

<b>ACTIVITY 1: From EO products to insurance solutions</b>	
<p><b>Objectives:</b></p> <ul style="list-style-type: none"> <li>• Realise increased adoption of EO in the agro-insurance sector</li> <li>• Demonstrate value for potential uptake of EO within the agro-insurance sector</li> </ul>	<p><b>Expected efforts:</b> SHORT TERM</p> <p><b>Cost estimates:</b> LOW COST</p>

<ul style="list-style-type: none"> <li>• Close the gap between perceived capabilities of EO services and the agro-insurance sector’s specific needs</li> <li>• Identify ways how various EO products fit into agro-insurance solutions</li> </ul>	
<p><b>Tasks:</b></p> <ul style="list-style-type: none"> <li>• Conduct a dedicated workshop that assembles key experts from the agro-insurance’s sector as well as the EO industry.</li> <li>• Demonstrate results from current project</li> <li>• Outline possible support by EO industry for future insurance solutions</li> <li>• Provide information about new opportunities on the market of agricultural first- and reinsurances</li> <li>• Starting with EO capabilities and agro-insurance’s needs, it can be discussed how the EO products fit into needs of the insurance’s workflows and how a service needs to look like so that it can be uptaken by the insurances.</li> <li>• Use the EO Capabilities Report as input; in case <i>ACTIVITY 2: Development of new products, i.e. agro-insurance solutions</i> has already been performed this could serve as input as well. Based on the developed used cases, the solutions can be developed exemplary.</li> <li>• The workshop will address the question, where and how EO can complement and contribute to insurance products.</li> </ul>	
<p><b>Targets/output:</b></p> <ul style="list-style-type: none"> <li>• Determine from a technical and thematical perspective, how an EO products needs to be developed to fit into agro-insurance’s needs.</li> <li>• Output: Workshop report</li> </ul>	

ACTIVITY 2: Development of new EO products, i.e. agro-insurance products / solutions	
<p><b>Objectives:</b></p> <ul style="list-style-type: none"> <li>• Realise increased adoption of EO in the agro-insurance sector</li> <li>• Demonstrate value for potential uptake of EO within the agro-insurance sector</li> <li>• Develop use case(s) that are tailored to the user’s needs</li> <li>• Redefine and test the proposed EO solutions</li> <li>• User driven approach</li> </ul>	<p><b>Expected efforts:</b> MID TERM / LONG TERM (depending on use case(s))</p> <p><b>Cost estimates:</b> MEDIUM COST / HIGH COST (depending on use case(s))</p>
<p><b>Tasks:</b></p> <ul style="list-style-type: none"> <li>• Develop new products based on case studies with high user engagement to develop <i>Best Practice Solutions</i> for further uptake in the agro-insurance sector</li> </ul>	

- Input: Consolidation meetings with champion users to define use cases; if available: output from *ACTIVITY 1: From EO products to insurance solutions*
- Technical input: available EO capabilities, techniques and products
- Technical development of EO products
- Constant user engagement with champion users of the solutions to develop a service that best fits in the daily work of the insurances
- Collection of user feedback to ensure smooth updating of the prototypes on the platform
- Output will be a report collating all use cases, the potential benefits for the agro-insurances and the final evaluation by the champion users

**Targets/output:**

- Development of use cases which serve as *Best Practice Solutions* for further uptake in the agro-insurance sector.
- Output: Use Case & Evaluation Report
- Outputs could be presented within *ACTIVITY 3: Increase visibility within the agro-insurance’s sector*

**ACTIVITY 3: Increase visibility within the agro-insurance’s sector**

**Objectives:**

- Enable utilisation of EO solutions by the agro-insurance sector
- Raise awareness for existing EO capabilities that might be suitable for agro-insurance’s purposes
- Supporting activities to raise awareness and gain visibility within the agro-insurance’s sector
- Dissemination and promote outcomes of the project and any further activities

**Expected efforts:**

LONG TERM

**Cost estimates:**

LOW COST

**Tasks:**

- Participation in selected agro-insurance related workshops, conferences and meetings
- Presentation of the project, current status and outcomes so far
- Presentation of any further activities to raise attention for the project activities
- Develop dissemination material

**Targets/output:**

- Communication to increase the visibility of EO within the agro-insurance’s sector
- Output: Dissemination material

**ACTIVITY 4: Provide training and support**

**Objectives:**

- Raise awareness for existing EO capabilities that might be suitable for agro-insurance’s purposes
- Supporting activities to raise awareness and gain visibility within the agro-insurance’s sector
- Improve usability of EO based agro-insurance solutions
- Overcome currently existing technical and IT restrictions that hinder the usage of EO products within the sector
- Improve the usability of EO based agro-insurance solutions

**Expected efforts:**

LONG TERM

**Cost estimates:**

MEDIUM COST

**Tasks:**

- Prepare material to provide documentation to handle EO data, products and solutions
- Prepare (technical) user support material
- Provide guidance on technical requirements to gain full usage of EO based solutions
- Prepare workshops and training on EO in general but also the usage of the products and services

**Targets/output:**

- Enable utilisation of EO solutions by the agro-insurance sector

**ACTIVITY 5: Enhance EARSC working area**

**Objectives:**

- Supporting activities to raise awareness and gain visibility within the agro-insurance’s sector
- Communication to increase the visibility of EO within the agro-insurance’s sector

**Expected efforts:**

LONG TERM

**Cost estimates:**

LOW COST

**Tasks:**

- Expand and update the already established EARSC working area for description, review, discussion and documentation of all agro-insurance related topics
- Facilitate discussion, advice and networking amongst the user group and EO industry
- E.g. participation in EO cafe

**Targets/output:**

- Raise awareness for existing EO capabilities that might be suitable for agro-insurance’s purposes
- Output: EARSC working area

**ACTIVITY 6: Requirements of Reinsurances**

**Objectives:**

- Identify opportunities beyond this project’s focus
- Broaden the knowledge of challenges and requirements for a potential uptake
- Identify challenges and needs of reinsurances

**Expected efforts:**

SHORT TERM

**Cost estimates:**

LOW COST

**Tasks:**

- Extend cooperation from leading agricultural first insurances to include also leading reinsurances
- Identify and describe the geo-information requirements with the agricultural reinsurances sector based on a desktop review
- Conduct user meetings with reinsurance champion users

**Targets/output:**

- Identify potential future activities
- Output: Reinsurance Geoinformation Requirements Report

**ACTIVITY 7: Additional Stakeholders**

**Objectives:**

- Identify opportunities beyond this project’s focus
- Broaden the knowledge of challenges and requirements for a potential uptake
- Identify potential stakeholders
- Identify potential future activities

**Expected efforts:**

SHORT TERM

**Cost estimates:**

LOW COST

**Tasks:**

- Conduct an analysis on potential additional stakeholders
- Conduct a desktop review to engage complementary industry bodies that could open future collaboration opportunities

**Targets/output:**

- Engage further stakeholders using the project’s approach and the technical actions to be implemented
- Output: Potential Additional Stakeholder Report

**ACTIVITY 8: New Opportunities**

**Objectives:**

- Identify opportunities beyond this project’s focus
- Broaden the knowledge of challenges and requirements for a potential uptake
- Identify new opportunities for current stakeholders of first insurances

**Expected efforts:**

SHORT TERM

**Cost estimates:**

LOW COST

**Tasks:**

- Analyse immediate impact on business processes with regard to the global Covid-19 pandemic
- Analyse potential of ongoing technology shift towards web-based solutions
- Identify and describe changes of geoinformation requirements due to the Covid-19 pandemic within the agor-insurance sector with special regard to the prime users (first insurers)

**Targets/output:**

- Identify potential future activities
- Output: New Opportunities Report



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## 5 Conclusions

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Remote sensing offers many opportunities to the agro-insurance sector. Nevertheless, there is a major gap between the perceived potential and the actual uptake by the sector. However, as could be seen through the project's various activities, the challenges and needs of the agro-insurance's sector are numerous and there is a high potential for the EO industry. On the one hand, it seems there is a lack of awareness of EO products within the agro-insurance sector. On the other hand, from an EO industry perspective, it seems an adaptation of products to find suitable solutions that fit the daily workflows of agro-insurance is needed. This project was a first and big step to bring these two players, the agro-insurance and the EO sector, together. Based on the findings of this project, the roadmap defined some next steps and activities to improve the mutual understanding. The focus of the defined activities lies on:

- Demonstrate value for a potential uptake of EO within the agro-insurance sector
- Enable utilisation of EO solutions by the agro-insurance sector
- Communication to increase the visibility of EO within the agro-insurance's sector
- Identify opportunities beyond this project's focus

With these steps in mind, the EO industry will be able to better address the key challenges of insurers in the future.