e-shape

EuroGEO Showcases: Applications Powered by Europe

D3.3 Status of the ongoing sprint 1 and first assessment methodology

e-shape

The e-shape project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 820852

Abstract

An important challenge for e-shape is to move from 27 individual pilots split into 7 thematic showcases towards a global project, identifying the appropriate level of interaction to leverage pilots, showcases and WP3 interactions in the most efficient way. This has been triggered via an initial assessment of the pilots that has gathered many information about pilot's initial status and their targets at the end of the project, focusing on the three canonical user scenarios covering:

1. Establishing how the users discover, access the data or run the pilots;
2. Clarifying the new or improved EO service scope and development needs and its interactions with the EO resources (platforms and data) used as external resources;
3. Securing the outreach of the outcomes of the new or improved service.

This assessment has also focused on data management and sharing principles, including interoperability, use of standards, use of remotely sensed and in-situ data, use of infrastructure (DIAS, NextGEOSS, European Data Hub, others, …) and all technical details of the 27 e-shape pilots.

Out of this assessment, several transversal threads of work approach have been identified for WP3. Major challenges involved:

- Supporting pilots which are very heterogeneous on their initial state, maturity (TRL varying from 3/4 to 8), complexity, goals, resources used, architecture...
- Driving the Pilots' implementation cycle into a generic high-level framework that can provide enough flexibility to allow each pilot to meet its goals and to benefit from the very large portfolio of available European EO resources.
- Out of the implementation of the pilots, capture the knowledge and lessons learnt into the final guide for developers, decision makers, and experts.

This Deliverable 3.3, as a follow up of Deliverable 3.1 and 3.2, describes how this methodology is been implemented, the status of sprint 1 implementation and introduces the first assessment methodology. It also introduces the ongoing works.

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VERSION NUMBERING	
v0.x	draft before peer-review approval
V0.3	After the first review
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STATUS / DISSEMINATION LEVEL			
STATUS		DISSEMINATION LEVEL	
S0	Approved/Released/Ready to be submitted	**PU**	Public
S1	Reviewed	**CO**	Confidential, restricted under conditions set out in the Grant Agreement
S2	Pending for review		
S3	Draft for comments	**CI**	Classified, information as referred to in Commission Decision 2001/844/EC.
S4	Under preparation		

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1. INTRODUCTION

The D3.1 Pilots initial assessment report-vfinal.pdf has gathered many information about the pilots and defined some transversal threads of work to build the WP3 approach that had been described in into D3.2 Pilots Implementation Plans and Roadmap_vfinal.pdf.

As stated by D3.2, e-shape is rich of 27 pilots involving 55 Partners. This is a wonderful panel which is probably very representative of the full European Earth Observation community for which the project will:

- Write the "e-shape Development Guide" and offer a methodology to provide to the pilots as much flexibility as needed to benefit from the richness of the experience of all the partners while letting the pilots meet their own agenda with their communities or users,
- Capture the issues on which the project can support pilots to benefit as much as possible from the project,
- Guide pilots to benefit from the project as much as possible,
- Make sure that each of the 27 pilots progresses on a regular basis for the entire project duration,
- Capture the progresses, observe the successes, the failures, and capture the lessons learnt into the final Best Practices document.

This Deliverable (D3.3), as a follow up of Deliverable 3.1 and 3.2, describes how this methodology is being implemented, the status of Sprint 1 implementation, and introduces the first assessment methodology. It also presents the ongoing works.

2. PROCESS OF WORK FOR WP3

The workflow for WP3 is introduced in Figure 1. In this figure, the workflow is unfolding along time. A first phase consisted in the 'initial assessment' (green circles). The initial assessment, conducted in parallel to the co-design analyses, provided a first of overview of the functional relationships between users, data and infrastructures, forming a basis for analysis. In parallel, the expectations for support from e-shape could be formulated in detail by the Pilots. These outcomes provided fundamental roadmaps to initiate work within the Work Packages. **This work stream forms the left branch of Figure 1.**

After this initial assessment was performed, the Sprint strategy was designed, based on Challenges (presented in next section). Based on the formulation of the detailed Challenges, WP3 could map ambitions and initial expectations**. This forms the central branch in Figure 1.**

Within each Challenge, the Pilots had to specify internal milestones and means of evaluation. WP3 organized the collection of inputs, reviewed each Challenge and helped to specify milestones and final outcomes. The Sprint is monitored by the Jira-based Showcase Support Service operated by DEIMOS. On the basis of the collected Challenges and Milestones, a delivery schedule could be generated on a monthly basis. Sprint schedule is available in Annex 1. This monthly scheduling provides an important support for the Work Packages, provides targeted and timely support to the Pilots, and optimizes the use of their resources available to the project. **This forms the right branch in Figure 1.**

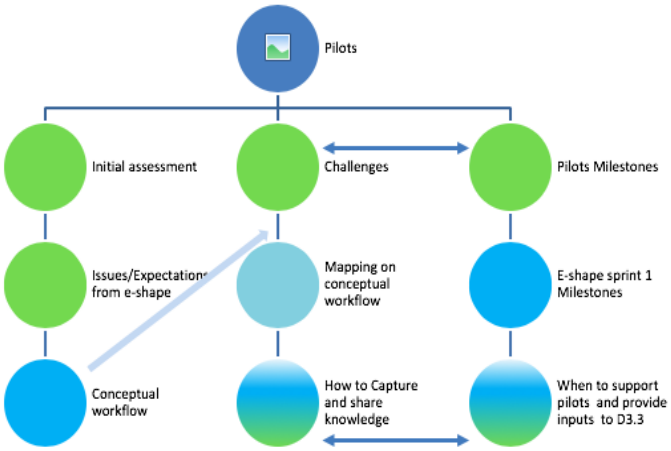

Figure 1: WP3 implementation strategy. The strategy unfolded along time, with an initial assessment gathering expectations, formulation of challenges and the progressive ramp up of support from e-shape. The green circles represent inputs from Pilots, Blue circles represent support from e-shape. The initial stages (green circles) are captured through deliverables D3.1 (Initial Assessment and Expectations) and D3.2 (Sprint 1 Challenges and Milestones).

3. SUPPORTING THE PILOTS AND GATHERING KNOWLEDGE FROM THE PILOTS

3.1. Current priorities

At this stage, WP3 has defined several criteria to define its works priorities:

- Define how the process of work will be implemented to be efficient in supporting the pilots and capturing the knowledge,
- Addressing the most popular expectations from the pilots first,
- Supporting the pilots with the shortest milestones first (timely support).

3.2. Sprint 1 WP3 Implementation process

The initial assessment delivered a mapping of the expectations for all Pilots (Figure 2 present the conceptual workflow). The results were extensively presented by D3.1 and D3.2. Similar diagrams were generated for each Pilots adding with pink arrows highlighting the focus of each pilot works in Sprint 1 (Annex 2), verified by Pilot leaders and compared with the co-design assessment. These synthetic charts indicate the main elements of infrastructure (represented by icons in Figure 2). The arrows represent the relationships between infrastructure elements. The blue flags represent the expectations collected from the Pilots regarding the support expected from e-shape, linked to the relevant element.

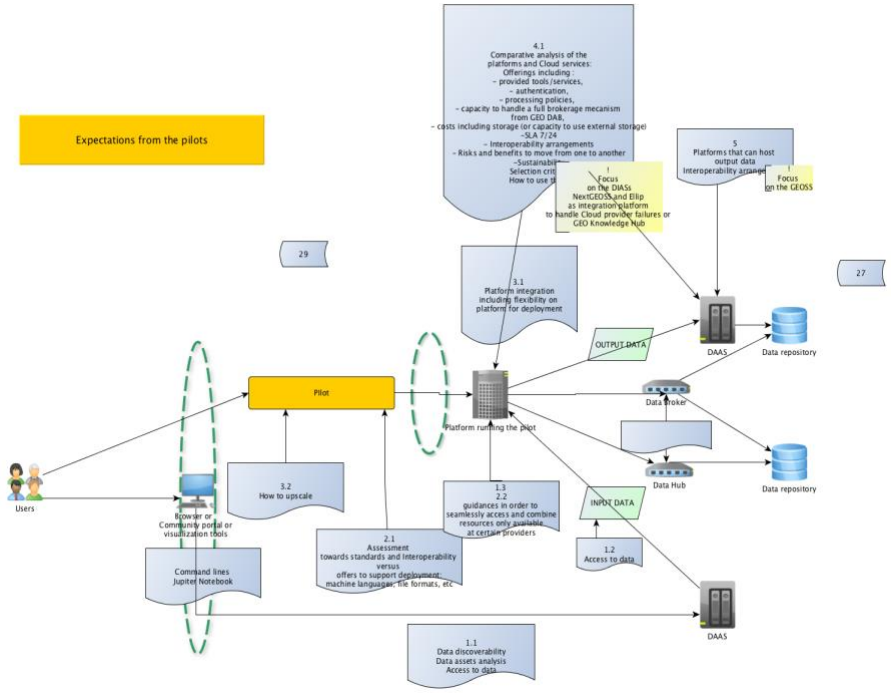

Figure 2: Conceptual Workflow. Example for a specific Pilot. Such diagram is specific to a Pilot. 27 diagrams were generated after the initial assessment, verified by the Pilot leaders, and compliant with the co-design assessment.

The Sprint process involved to cascade the e-shape's KPIs as challenges for the Sprint. Each KPI was formulated as a challenge. Each Pilot was invited to select three challenges. The free choice of challenges enabled each Pilot to engage within the project, while maintaining their own development agenda, compliant with their ambition, level of TRL and internal management processes. This freedom of engagement is an important element to secure commitment to delivery.

One challenge was mandatory to relate to infrastructures, and directly relevant to WP3 (Challenge 3). The other challenges are related to WP2, 4 and 5. Using this method, the Sprint was used as a mechanism to further drive development both on the Pilot side and on the Work packages. In challenge 3 (relevant to WP3) the intermediate milestones were added to the initial mapping, in order to spatially represent where efforts and resources of e-shape have been mobilized. In Figure 3, the pink flags represent the detailed mapping of the Sprint 1 challenges for a pilot in the Agriculture Showcase. Such mapping enabled to verify the alignment between the initial expectations formulated during the initial assessment phase, and the prioritization of Challenges for the Sprint.

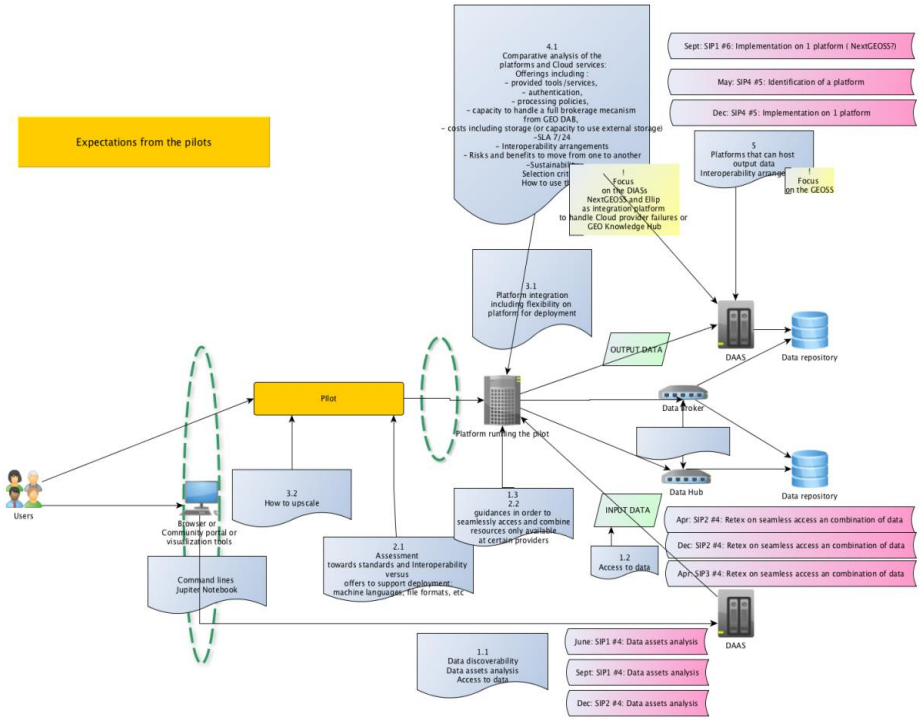

Figure 3: Focus of the pilots and expectations of WP3 from the pilots mapped into the conceptual workflow (Example Schema for a pilot in the Agriculture Showcase). The blue icons list the issues on which the pilots have expressed expectations of support from WP3. The pink containers identify focus of work of the pilots and the expectations of return of experience from WP3.

Based on the analyses, a document has been initiated on Confluence that could be the living draft of the final D3.8 deliverable[1]. This document offers a progressive discovery of the different issues mentioned into the conceptual workflow and identifies anchors to position the knowledge that will be captured by the pilots progressively during the Sprint 1. It will support the collection of the lessons learnt to address progressively the expectations expressed by the pilots.

3.3. Gathering knowledge on platforms

Based on the support expected by the pilots expressed in the initial assessment (D3.1), 19 pilots had expressed expectations related to a better understanding of the platform's services. Earth Observation Platforms are proliferating without any shared framework to compare them nor a clear understanding on how they relate in order to fully appreciate their diverse assets. Gathering knowledge on those platforms is therefore part of the initial focus of WP3.

WP3 has initiated a catalogue of more than 40 Earth Observation resources, looking to identify the relevant minimum information to define a good assessment framework that could be applied to each platform and would allow a rapid assessment for the reader. This catalogue is available to all consortium members on Confluence[2]. It will be improved during the project lifetime but it was important to begin an early draft of the landscape of the available resources.

Priority has been given to the resources mentioned by the pilots into the initial assessment but this initial catalogue does not cover all the available resources available in Europe and it could be extended later on if the time allows (e.g. some TEPs are missing, the RUS Copernicus portal, and others for instance).

[1]Hyperlink: Sprint 1 progress per topic of interest, per pilot and per challenge (ongoing)
[2] Hyperlink : EO Resources information (ongoing)

3.3.1. Special focus on the DIAS

Among these platforms, the different DIAS' represent a special set of resources that is very valuable as they provide a full portfolio of state-of-the-art Cloud services dedicated to Earth Observations as well as Copernicus data and applications. Many expectations from the pilots relate to these resources because:

- They are very attractive to Earth Observation developers,
- They represent a significant investment from the European Commission,
- They are implemented and managed by major European stakeholders,
- Their individual value proposition is not distinguishable at the moment as they result from a single tender and therefore share the same initial specifications and concepts,
- Moving an application to a cloud requires an important investment of skilled staff, so this represents a risk that the partners want to understand.

From the Initial Assessment Phase of e-shape, and the First Pilot Sprint, initial conclusions indicate a high complexity in identifying the most appropriate technical and financial offering of the DIAS' and European platforms. It is expected that there is a lack of ability from non-expert to benchmark and compare price offering without a high level of skillset, out of reach to many organizations, including SMEs and small-scale research laboratories.

The transaction costs and technology risk being perceived as high, few Pilots only were interested in migrating to a new Cloud platform or DIAS during the initial assessment phase. Thus, a special analysis is ongoing to support the partners in assessing the DIASs solutions for their pilot's needs. This analysis has been done based on information available on the web at the moment and synthesized on Confluence[3]**.** It will be consolidated with a direct dialogue with the DIAS providers and then with the return on experience form the pilot's implementations later on. The situation improved slightly after information and support was provided by e-shape.

Beyond understanding the existing capabilities and reaching out to the appropriate channels, initial experience from the e-shape Pilots has shown that the 'last mile' of negotiations has still to be performed bilaterally between technical teams. The relationship is a learning process, which is highly time-consuming for technical experts on both sides.

For example, the DIAS information on the web is not standardized so they refer to terminologies that can somehow differ, especially on the tools and libraries they provide. A page is also under construction on Confluence[4] to describe these tools, libraries and vocabularies and eventually support a convergence towards a consistent description.

More fundamentally, at the moment, despite many efforts, the use of European platforms exploiting the wealth of EO data is time consuming and far from plug and play, and each application is a tailor-made technical and contractual arrangement, forming a major barrier to upscaling the use of the European Earth Observation Infrastructure to support the European commitments to sustainability and growth.

On the regulatory side, there is room to improve commercial regulations in the sector, by elaborating best practices with the developers of EO applications, regarding the standardization of offerings, guiding a standardization of the expression of the needs, allowing facilitating access and use of the infrastructures, but also allowing to benchmark and compare offerings.

On the operational side, there is an urgent need to develop a strong operational support to EO-based application developers; to train and guide them through the range of offerings and European capabilities

[3] Hyperlink : DIASs analysis - August 2020 (ongoing)
[4] Hyperlink : Glossary on DIAS-related denominations

available. This service should seek to be first institutionalized within e-shape, and further brought into EuroGEO.

This workstream has initiated a reflection with the PMT and Executive board, on the opportunity to engage the DIAS' (and by extension the European Platforms) as Associate Partners to e-shape, with the view to converge towards an integrated European initiative in support of EuroGEO, integrating:

- On the one hand the user-centric approach of the flagship e-shape project in developing effective services in support to EuroGEO;
- And on the other hand building a consistent vision of a European Earth Observation System of Systems where the multiple data, platform and resources would be seen like a source of richness and resilience rather than a source for complexity and fragmentation.

3.4. Supporting cross-fertilization between pilots and partners

The 55 e-shape partners gather globally a lot of expertise on Earth Observation and it is critical to WP3 to collect and support a structured and efficient exchange of knowledge.

3.4.1. Collaborative work spaces

The partners are encouraged to improve the information gathered into the EO Platforms catalogue, on the DIASs analysis, ... with their theoretical knowledge and their applied experience. WP3 also encourages pilots to refine their questions and needs related to infrastructures. This is collected via Confluence to support discussions with platforms providers.

This is critical for instance to appreciate the pricing strategies of the DIASs, as pricing is approached and presented very differently from one DIAS to another. For instance, disk access and CPU time can vary widely for each pilot along is upscaling trajectory to market. As the pricing are formulated differently across DIAS', the primary means to compare options for a given pilot is to perform cost simulations with real pilots and seek to identify typologies of needs which are more or less favorable.

All pilots have been encouraged to:

1. Assess the formulation and review of their individual Sprint challenges (captured by the JIRA-based Showcase Support Service) , and ensure WP3 has captured correctly the goal of their challenges and possible contributions to the global knowledge, in line with their initial assessment's conceptual workflow (Annex 2),
2. Maintain a close interaction with WP3 in progressing towards the Sprint's milestones (Annex 1),
3. Identify challenges related to the implementation or architecture of the pilot.
4. Capture progresses on Confluence[5]

4. STATUS OF THE WORKS (NOVEMBER 2020)

4.1. Sprint monitoring

The good progress of the pilots challenges related to WP3 is monitored via a dashboard that maps the status of the milestone relatively to its targeted deadline.

[5] Hyperlink : Sprint 1 progress per topic of interest, per pilot and per challenge

When the status of a pilot looks to be delayed compared to what it should be, an update is requested to the pilot lead. It is the opportunity to identify if there is a specific need of support. When the status is set to M1 DONE, the Work Package Lead can contact the pilot to verify the progress and identify some lessons learned to capture the knowledge that can be shared and reused from the ongoing implementations. This will be captured into the draft of the e-shape Best Practices development Guide.

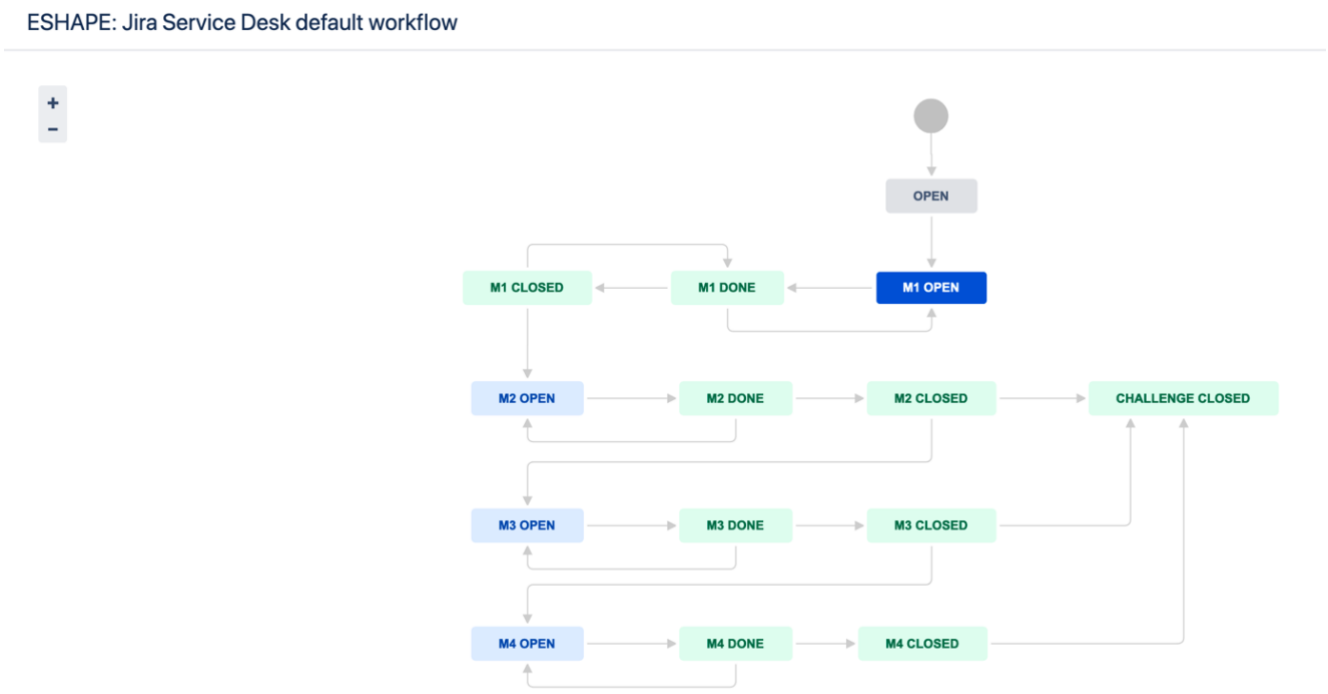

Figure 4: Sprint workflow implementation on JIRA

Table 1 shows an example of the Sprint monitoring process. Detailed analyses are available by Work Package. The table allows following the evolution over time. As of Nov. 2020, 2/3 of the events appear delayed. The Sprint master (WP3) engages with the owners of each Challenge to identify the bottlenecks and address the issue. Experience shows that deviation to plans is often a lack of reporting into the Showcase Support Service. Adoption of the tool is still ongoing and improving over time. A significant effort of education and awareness had to be conducted to drive change of practices and adoption.

Table 1: Sprint dashboard monitoring. Extract as of Nov. 2020.

Labels	OPEN	M1 OPEN	M1 DONE	M1 CLOSED	M2 OPEN	M2 CLOSED	CHALLENG	M3 DONE	T:	Delayed
Jan-20	0	0	0	1	0	0	0	0	1	
Feb-20	0	0	0	0	0	2	0	1	3	0%
Mar-20	0	1	1	0	0	1	0	0	3	14%
Apr-20	2	4	5	1	4	1	0	0	17	46%
May-20	2	5	3	0	1	0	1	0	12	53%
Jun-20	3	4	3	0	2	0	0	1	13	57%
Jul-20	1	5	1	0	0	0	0	0	7	61%
Aug-20	0	3	0	0	1	0	0	0	4	63%
Sep-20	4	5	1	1	1	0	0	0	12	67%
Oct-20	1	3	2	0	1	0	0	0	7	67%
Nov-20	1	5	1	0	0	0	0	0	7	
Dec-20	12	10	8	0	4	0	0	0	34	
Jan-21	1	0	0	0	0	0	0	0	1	
May-21	2	0	1	0	0	0	0	0	3	
May-22	2	0	0	0	0	0	0	0	2	
Sep-22	1	0	0	0	0	0	0	0	1	
Nov-22	0	0	1	0	0	0	0	0	1	
Total Unique	23	36	17	3	7	2	1	1	90	

4.2. Knowledge management - Referencing European platforms and sharing of experience

WP3 seeks to address the most popular expectations from the pilots first and support the pilots with the shortest milestones first. The most popular expectation is to get better knowledge on the platform and especially on the DIAS, which is therefore a major scope of work for the period.

A catalogue of the platforms used or planned to be used by the pilots has been initiated **,** and listed on Confluence[6], this list of nearly 50 European capabilities are organized by clusters (GEOSS related, Copernicus related, DIAS, TEPs related, ...).

To collect and disseminate the information efficiently, a first framework of description has been initiated to identify the Cloud services type they offer: Portal, DaaS (Data as a Service), IaaS (Infrastructure as a Service), PaaS (Platform as a Service), SaaS (Service as a Service). This framework is being currently being refined to characterize the platforms in term of:

- Thematic = Some platforms are thematic others are generalists
- Coverage_Focus = Regional or Global
- Data_Type = Satellite, in situ , Citizen Science, …
- User_Focus = Researchers or On duty operational users requiring real time information
- Cloud_Services = Portal+DaaS+PaaS + SaaS ;
- Data_Eviction_Policy = the platforms can have a data management and move offline or suppress old data for instance
- Governance = the platform governance can be Private, Public or the result of a Public-Private Partnership.

A specific analysis of the DIASs is also ongoing[7]. This work captures the lessons learned from the applied assessment made by the pilots.

4.3. Learnings from initial engagement with the DIAS'

In the framework of the Sprint, ARMINES had defined a DIAS-related Challenge for S3P2 (Challenge #5: Pilots ready for integration in AAS IT infrastructure such as DIAS, NextGEOSS). This pilot is the first mover in this direction and particular emphasis was put on monitoring, supporting the process, and extracting lessons learnt and best practices in support of all e-shape pilots.

The initial state of the challenge consisted in the use of algorithms, codes, scripts and services in production on Terradue/EGI NextGEOSS platform as the basis for the development of the pilot, with a preparedness index as 3 (from 0 to 5). The expected final state at the end of Sprint 1 consisted in the initial remote process (WPS) being accessible for early testing on a DIAS.

As a first milestone, by the first e-shape review meeting, a clear understanding of technical and financial DIAS's offers including specifications, performances, constraints and limitations to support and hosting the pilot were expected.

S3P2 conducted a detailed formulation of the technical requirements for the pilot. On this basis, each DIAS was contacted and quotations were asked, followed by technical meetings with the teams on each side.

[6] Hyperlink: **EO Resources information**
[7] Hyperlink: DIASs analysis - August 2020

From this experience, a web page was built on Confluence to consolidate the main findings and lessons learnt from this interaction[8]. The document provides a detailed analysis of the DIAS' capabilities and pricing for the specific pilot application. The conclusions at this stage are:

- The 'last mile' of negotiations has still to be performed bilaterally between technical teams;
- The relationship is a learning process, which is highly time consuming for technical experts on both sides.
- At the moment, despite many efforts, the use of European platforms exploiting the wealth of EO data is time consuming and far from plug and play, and each application is a tailor-made technical and contractual arrangement.

These findings were brought into the context of e-shape, and nurtured the discussion regarding the engagement between e-shape and the platform providers. In the future, further elements of comparison will be brought from the future interactions between the e-shape pilots and the DIAS'.

[8] Hyperlink: https://confluence.mines-paristech.fr/x/r6N3

5. ANNEX 1: SPRINT 1 – MONTHLY DELIVERY SCHEDULE PER PILOT, PER CHALLENGE AND PER MILESTONE

5.1. JANUARY 2020

S7P1 Global Carbon & GHG Emissions

Challenge #4: demonstrated improvement in exploiting the wealth of data .. In DIAS .. Any other existing hubs and platforms

- **Initial state:**
  - FluxCOM has several versions and updating requires manual work. Aim is to develop more operational environment.
  - Only one ocean flux map available at the moment in ICOS CP. Connection between ICOS and SOCAT data?
  - Satellite anomalies for detecting sinks and sources of CO2 is existing, but not as a service.
- **Final state:** Spatial datasets (Preferably spatially and temporally co-located) in DIAS, linked to in-situ dataset in Carbon portal
- **Mean of evaluation:** Carbon portal user statistics
- **Final material to be produced (prototype; demo; video; poster…):**
- **Milestones:**
  - Upload satellite dataset for 2018 in DIAS.
  - Upload a model dataset (either Fluxcom, Fluxengine or both) in DIAS.
  - Create connection between ICOS CP and DIAS.
  - **Milestone defined by WP3:** Plan milestones over 2020 sprint 1 period of time for the 3 challenges before 31 janv. 2020.

5.2. APRIL 2020

S1P2 EU-CAP_Support

In S1-P2 (EU-CAP), Copernicus data will be used in combination with ancillary datasets (e.g. soil maps, weather data, LPIS, crop calendars) to extract phenological stages and estimate crop yield for cotton at three different levels, at national, at regional and at local scale. The aforementioned products have been identified as critical services missing from the GAIASENSE solution, on which this pilot builds upon. Additionally, advanced EO techniques and machine learning pipelines will be incorporated to enhance the existing services of the GAIASENSE platform. The first sprint will focus on the following:

Challenge #4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms

- **Initial state:** Exploring the relevant existing platforms such as the GAIASENSE smart farming system in terms of content, architecture, spatial and temporal resolution, interoperability. Current crop growth stages are delivered exclusively through the seasonal NDVI profile (Sentinel-2).
- **Final state:** More information sources will be included to provide a variety of data. Integration of the various EO and meteorological datasets.

a. Use and extend and in-house (NOA) umbrella API that connects to multiple Sentinel Hubs (DIAS, Open Access Hub, Hellenic mirror site) acting as a single access point for all Copernicus missions' data.

b. GEO-CRADLE database: Data libraries provided by Regional Data Hub (RDH) and delivered from "Improved Food Security – Water Extremes Management (IFS)" will be used. The soil spectral libraries of RDH will be explored, in cooperation with partner I-BEC, to produce soil maps, through fusion with Sentinel-2 data

- **Means of evaluation:** For 1. Showcase with appropriate metrics the enhancement in a) data availability, b) latency and c) download speed when using the umbrella API versus the Copernicus Open Access Hub. For 2. Enriched system with more datasets.
- **Final material:** A prototype of the methodology will be generated at the end of sprint 1, utilizing to some extent the aforementioned datasets.
- **Milestones:**
  - Sprint interim assessment: M11 Apr 2020. Progress in parallel for the two services of phenology extraction (towards working prototype) and yield estimation (towards defining a complete methodological design), final specifications following the co-designers' requirements.
  - End Sprint 1: M20 Dec 2020. 1st working prototype of phenology extraction in Level-1 and Level-2 (that is national and regional scale) and completed design for yield estimation in Level-1 and Level-2 (its implementation to follow in Sprint 2).

S1P3 Vegetation-Index Crop-Insurance in Ethiopia

Challenge #4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms

Transition from Proba-V based to Sentinel-3 based monitoring

- **Initial State (based on WP3 assessment)**: PROBA-V data captured through the EUMETCAST system were processed by mandated users in Ethiopia (= NMA) into VICI NDVI-Index data that were in-turn provided to key GIACIS-partners for operational insurance purposes.
- **Final state:** Continuation of the preparation of VICI NDVI-Index data series (starting early 2020), but now through processing Sentinel-3 Synergy-V10 data, as made available through EUMETCAST and as originally processed through the COPERNICUS services of ESA. Note: This urgently requires an early release of properly calibrated CGLOPS NDVI V3-data; till date only beta-releases of the required product have been provided. These data have as yet no use for VICI.
- **Means of evaluation:**
  - Properly calibrated, geo-referenced, and composited Sentinel-3 Synergy-V10 data are provided in a fully operational way through COPERNICUS (of ESA) by April 2020 latest.
  - The provided Sentinel-3 Synergy-V10 data are added to our repositories and pre-processed to provide a continuous timeseries to the 1998-2019 COPERNICUS_VGT_PROBA_0.1 imagery as provided to us by VITO early Oct.2019 (data release candidate no.3 (rc3)).
  - The NDVI-data are on a dekad-by dekad basis processed into the required VICI-data.
  - The 1998-2019 NDVI (rc3) data are used to re-calibrate VICI and to re-set the trigger and exit thresholds that specify drought situations by Crop Production System Zone.

- **Final material to be produced (prototype; demo; video; poster…)**: VICI data, based on Sentinel-3 Synergy-V10 imagery, are delivered on a dekad-basis to relevant users. This includes the means to download, pre-process, and interpret the NDVI data.
- **Two main milestones to be achieved:**
  - Consistency between data of the old (PROBA-V) and new (Sentinel-3 Synergy-V10) platforms is assessed and documented. *This must be completed by April 2020.*
  - Re-calibrated VICI trigger and exit-thresholds, denoting drought occurrence by CPS-Zone, are made available. *This must be completed by April 2020.*
  - VICI product, based on Sentinel-3 Synergy-V10 data is delivered to users. *This must have started by April 2020.*

S3P2 High PV penetration in urban area ARMINES part

Challenge #5: Pilots ready for integration in AAS IT infrastructure such as DIAS, NextGEOSS (Focus Sprint 1)

Initial state: Use of algorithms, codes, scripts and services in production on Terradue/EGI NextGEOSS platform as the basis for the development of the pilot. Preparedness index as 3 (from 0 to 5).

Final state: Initial remote process (WPS) are accessible for early testing on a DIAS.

Means of evaluation: Get results from a machine-to-machine remote access (WPS) deployed on the DIAS.

Milestones:

- M11 - First e-shape review meeting: A clear understanding of technical and financial DIAS's offers including specifications, performances, constraints and limitations to support and hosting the pilot.
- M15 - Initial remote process (WPS) is successfully tested on a DIAS.

S5P4 Sargassum detection for seasonal planning

Challenge #6: O2-3: Usage of the DIAS

- **Initial state:** Existing chain retrieves satellite data from S-3, S-2, MODIS directly from space agencies.
- **Final state:** Adapt the CLS operational chain and prepare for integration in a DIAS to access satellite data. Deploy the Sargassum detection chain on a DIAS.
- **Means of evaluation:** use sentinel data provided by a DIAS for the calculation of the Sargassum index. Review and acceptance of the chain ready for dockerization at the interim meeting (April).
- **Final material:** the operational chain dockerised and deployed and operated on a DIAS.

S6P2 GEOSS for Disasters in Urban Environment Sprint 1 Challenge

Challenge #4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, Nextgeoss, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms

- **Initial state:** The EO Sentinel data are downloaded manually for each research experiment.
- **Current status:** Automatic procurement of Sentinel-1 GRD products and Sentinel-2 level 2 product already implemented during the first part of the project from Copernicus Open Access Hub over the

Italian territory. Automatic calculation of NDVI from Sentinel-2 level 2 products already implemented with calibration and geocoding of the downloaded variables.

- **Final status:** Automatic procurement of all variables needed by the hydro/fire- meteorological chain implemented with calibration and geocoding of all the downloaded variables over the Italian territory. Automatic calculation of Soil Moisture from Sentinel-1 GRD products.
- **Milestones**:
    - M11 - Successful testing of daily operationally automatic download for GRD and NDVI over Italy.
    - M20 - Successful testing of daily operationally automatic download for all variables needed over Italy.
- **Final material:** Report about the scripts functioning for the automatic procurement, calibration and geocoding of the aforementioned Sentinel variables.

S6P4 Resilient and Sustainable ecosystems including Agriculture and food

Challenge #4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, Nextgeoss, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms

- **Initial state:** Exploring the relevant existing platforms such as the GAIASENSE smart farming system in terms of content, architecture, spatial and temporal resolution, interoperability.
- **Final state:** Integration and homogenization of the various EO and meteorological datasets (multiple time scales, spatial extents, grid resolutions, blending gridded with point data), statistical analysis, extraction of the critical climatological indices for the selected crop type (cotton) over the area of study (Rodopi, Greece), and improvement of the spatial resolution where necessary. Use and extend the in-house (NOA) umbrella API that connects to multiple Sentinel Hubs (DIAS, Open Access Hub, Hellenic mirror site) acting as a single access point for all Copernicus missions' data.
- **Means of evaluation:** Enriched system with more datasets.
- **Milestones:**
    - Prototype for 3 of 4 services.

MAY 2020

S1P4 Agro-industry

The starting point for Pilot 4 is the existing WatchItGrow (WIG) platform, which provides EO-based information to the potato growers and -industry. In the first sprint, the focus will be on extending these services to other crops and users. Key aspect will be to properly understand the specific needs of these users, and the development of new services that correspond to those different needs. In this regard, a co-design approach will be essential, where the new services will be developed in close collaboration with a select number of new potential users. The different tasks for the first sprint can be categorized as following:

Challenge #5: Increase in preparedness index for integration into AAS IT infrastructure such as DIAS, NextGEOSS, etc.

In addition to the development of the new service as stipulated in the previous challenges, there will also be a focus on integrating components of the existing services on different platforms. Currently, all services are run in-house as the current focus is on Belgian end-users. However, with the foreseen expansion to

other areas, a more agile set-up is needed, for which a transfer to online platforms is needed (challenge 5).

- **Initial state:** Current services are run in-house, including sentinel data download and pre-processing. Preparedness Index is thus 0.
- **Final state**: current services and workflow components, especially those that will be needed for the new services foreseen in challenge 1, will be transferred to one of the mentioned platforms. Preparedness Index: 3 (prototype in an operational environment).
- **Means of evaluation: -**
- **Final material:** Operational services from WIG running on one of the platforms.
- **Milestones:**
    - May 2020: identification of the platform to be used (DIAS, NextGEOSS,…).
    - December 2020: services to be transferred are operational on the platform.

S2P2 EO-based surveillance of POPs pollution

Challenge #7: Demonstrated compliance with inspire, GEO recommendations interoperability and geo data sharing principles

- **Initial state:** No compliance with INSPIRE standards, poor visibility of GMP data in GEOSS.
- **Final state:** Data collected within Global Monitoring Plan campaigns are linked to GEOSS.
- **Means of evaluation:** Data are described by standardized metadata sets and are discoverable via GEOSS portal.
- **Milestones:**
    - Prototype - May 2020
    - GMP 2 DWH linked to GEOSS - July 2020

S4P1 mySPACE

Challenge #5: increase in preparedness index for integration into "As A Service (...AAS)" IT infrastructure such as DIAS, NExtGEOSS

- **Initial State:** Building on the H2020 Ecopotential project achievements, mySPACE will extend the approach adopted to quantify changes in a larger ensemble of sites covering different biogeographic regions. At the moment, several services (e.g. Delft 3D, HydroPeriod) and algorithms (e.g. Automatic inundation mapping from Sentinel2 data, DINEOF) exist, all of them with a different maturity level.
- **Final state:** Increase the preparedness index of the advanced open access algorithms (e.g. for hydroperiod calculation and services) and, as a result of Sprint 1, to have products ready to be deployed into infrastructure such as DIAS.
- **Means of evaluation:** Report on the relevant processing procedures
- **Final material to be produced (prototype; demo; video; poster…):** Advanced open access algorithms.
- **Milestones**:
    - Service Preparedness for DIAS integration (Dec 2020).
    - Clearly identification of user's needs (Dec 2020).

S4P2 mySITE

The development of the mySITE pilot builds on the integration and linking of the existing infrastructure components DEIMS-SDR, eLTER DIP and AgroSense. At the moment, they mainly co-exist independently and are fully operational within their respective usage domain. The main aim of the mySITE activities in Sprint 1 is to integrate these three components into a coherent, distributed system of interrelated services, while interoperability with the other showcase pilots shall be the focus of Sprint 2 activities. DEIMS-SDR and eLTER DIP will serve as metadata and data sources, while AgroSense will serve as data aggregator.

DEIMS-SDR will be extended to a) offer a flexible API for metadata retrieval which will support efficient provision site descriptions and dataset metadata (along with online reference to its data sources) and b) to evaluate the technical integration of additional site descriptions/catalogues such as the Common Database of Designated Areas (CDDA, including the Natura 2000 protected sites).

The AgroSense platform will be adapted to serve as a general platform “EcoSense” to explore in-situ and remote sensing data at research site level. This will enable the dynamic retrieval and display of site information provided by DEIMS-SDR in order to let users select a site of interest and retrieve related metadata on in-situ observations via eLTER-DIP. For data provided by standard services, the in-situ data can subsequently be displayed alongside remote-sensing data products, which at the Sprint 1 stage will consist of existing layers calculated for AgroSense, to be extended to mySPACE data throughout Sprint 2. Based on the planned activities and their outcomes, challenge #4 will be thus addressed by the adoption and adaptation of AgroSense to use the publicly available in-situ data sources from LTER and combine it with Sentinel based data products as well as the evaluation of options to integrate site information from other external site registries. Challenge #7 will be addressed by focusing on the implementation of INSPIRE conforming interfaces and data representations, while challenge #2 shall be achieved by unifying the user base of the three independent components and underlying communities. The main focus will be the extension from a research community based focus to protected area managers, site managers and regional stakeholders (e.g. regional planning authorities). The results of Sprint 1 will be provided in form of a working prototype.

Challenge #4: All pilots should exploit the IT capabilities and the wealth of data made available

- **Initial State:** fully operational but independently existing infrastructure components DEIMS-SDR, eLTER DIP and AgroSense need to be integrated into a coherent, distributed system of interrelated services (interoperability with the other showcase pilots shall be the focus of Sprint 2) (To Be Confirmed).
- **Final state:**
    - Integration and linking of the existing infrastructure components DEIMS-SDR, eLTER DIP and AgroSense to use the publicly available in-situ data sources from LTER and combine it with Sentinel based data products.
    - evaluation of options to integrate site information from other external site registries.(To Be Confirmed).
- **Means of evaluation:** Functional state of mySITE pilot serves as proof-of-concept.
- **Final material to be produced:** provided working prototype.

Challenge #7: Demonstrated compliance with inspire, GEO recommendations interoperability and geo data sharing principles

- **Initial state:** No INSPIRE conforming interfaces and data representations available at the moment (To Be Confirmed).
- **Final state;**implementation of INSPIRE conforming interfaces and data representations. (To Be Confirmed).

- **Means of evaluation:** Representatives of all pilots cross-check compliance.
- **Final material to be produced (prototype; demo; video; poster…):** Documentation of standards/best practice compliant interfaces will be included in the prototype mentioned under challenge 4.
- Milestones:
  - Functional state of the redesigned DEIMS-SDR API (by December 2020).
  - Functional state of the adapted EcoSense platform (by December 2020).

S5P2 Satellite Earth Observation-derived water bodies and floodwater record over Europe

Challenge #6: Usage of the DIAS

- **Initial state:** We have currently three services implemented on the DIAS: i) an 'on demand' flood mapping service based on Envisat data (platform: ESA GPOD), ii) an 'on demand' flood mapping service based on Sentinel-1 data (platform: ESA GPOD, WASDI, Hydrology TEP) and iii) a systematic Sentinel-1 based flood mapping service covering three countries in SE Asia (platform: WASDI).
- **Final state:** We are planning to setup a new systematic Sentinel-1 based flood mapping service over Europe on NextGEOSS.
- **Means of evaluation**: The Sentinel-1 image archive over Europe (2012-present) can be processed with our software implemented on NextGEOSS.
- **Final material:** The processing chain is implemented on NextGEOSS and used to generate the flood record of Europe (including the generation of derived products defined under Challenge#3) . By the end of sprint 1 we plan to have a DIAS-generated flood record available for selected test areas over Europe.
- **Milestone:** our software should be implemented on nextGeoss halfway through the sprint so that after initial testing the data processing can start at the end of the sprint.

S5P3 Diver Information on Visibility in Europe

Challenge #6: Usage of the DIAS

- **Initial state:** Currently the processing is done ad-hoc and locally at PML's premises. Data services are also hosted at PML for use within the App.
- **Final state:** We would really like to be able to move not only our data processing to the "cloud" or onto a DIAS platform we would also like to host of data services their two. This would, in theory, give us greater resilience to an increase in users as well as service stability.
- **Means of evaluation**: Our data processing is done on a/the selected DIAS platform, web services (possible WMS, WFS & WCS) are hosted and served from within the DIAS and consumed by the App.
- **Final material:** The ability to process data and server web services from a DIAS, although this will be dependent of
- **Milestone:** At the halfway point of the sprint, we would like to have at a minimum a dockerised (or other container system) version of our processing running on a DIAS with access to the required data from CMEMS, this will be followed up with the creation of web services for the final milestone at the end of the sprint.

S6P1 Data for Detection, Discrimination and Distribution (4D) of Volcanic ash

Challenge #4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus), citizen observatories and any other existing hubs or platforms.

- **Initial state:** 4D ash based currently on satellite algorithms and on aspherical particle identification based on ACTRIS aerosol lidars.
- **Final state:** During sprint 1, 4D ash services and outputs will make use of aerosol lidar observations close to volcanic area in Sicily and will exploit the potentiality of use of ceilometer data at IMO, Iceland and of satellite-borne lidar observations provided by CALIPSO. All these will be ingested into the EUNADICS-AV portal for the 4D ash service.
- **Means of evaluation:** EWS product available for INGV for a case study and feasibility of ceilometer & CALIPSO ingestion assessed.
- **Milestone:** Set up of the API services for connection between the original sources (e.g. ACTRIS datacenter, IMO and INGV local servers) and the EUNADIC-AV portal service (identified platform) – May 2020.
- **Final material:** Draft of the paper about a selected case study ready.

S7P1 Global Carbon & GHG Emissions Sprint 1 Challenges:

Challenge #4: demonstated improvement in exploiting the wealth of data .. In DIAS .. Any other existing hubs and platforms

- **Initial state:**

FluxCOM has several versions and updating requires manual work. Aim is to develop more operational environment. Only one ocean flux map available at the moment in ICOS CP. Connection between ICOS and SOCAT data? Satellite anomalies for detecting sinks and sources of CO2 is existing, but not as a service.

- **Final state**:spatial datasets (preferrably spatially and temporally co-located) in DIAS, linked to in-situ dataset in Carbon portal
- **Mean of evaluation**:2020: Assessment report in wiki 2022: Carbon portal user statistics
- **final material to be produced** (prototype; demo; video; poster…)
- **Milestones:**
    - Compare different DIAS service providers - May 2020
    - upload satellite dataset for 2018 in DIAS - May 2021
    - upload a model dataset (either Fluxcom, Flux Engine or both) in DIAS - November 2022
    - Create connection between ICOS CP and DIAS - November 2022

S7P2 Urban resilience to extreme weather Sprint 1 Challenges:

Challenge #4: Demonstrated improve in exploiting the wealth of data ...

- **Initial state**: Usage of seasonal forecasts for P2 needs further processing and testing in terms of required spatial scales
- **Final state**: Usefulness of seasonal forecasts has been assessed, data are made available via C3S/DIAS (WekEO)

- **Means of evaluation:** Quality of seasonal forecast in terms of additional value
- **Final material to be produced (prototype; demo; video; poster…)** evaluation report
- **Milestones:** First data evaluation (temperature) completed (May 2020)

S7P3 Forestry conditions

> Challenge #6: identify and prepare outsourcing part of processing chain and web service to WekEO infrastructure

- **Initial state:** Forestry service not yet available as web service; service not yet implemented on WEkEO, instead similar service running on own servers; challenge that C3S seasonal forecast data not accessible from WEkEO; full processing maybe too heavy for WEkEO server.
- **Final state:** Web service is implemented and running on WEkEO infrastructure.
- **Mean of evaluation:** Report on web service implementation.
- **Final material to be produced (prototype; demo; video; poster…):** Web service.
- **Milestone 05/2020:** Report on interface test and implementation of web app service.

1. JUNE 2020

S1P1 GEOGLAM

In S1-P1(GEOGLAM), Copernicus data will be used in combination with ancillary datasets (e.g. crop type, soil information, and weather data) to provide detailed crop calendars. Current EO-methods are mainly based on the definition of the start, peak and end of the growing season from the NDVI-profile, and these services will be extended to other parameters such as planting and harvesting date. The first sprint will therefore focus on different aspects:

> Challenge #4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms

Focusing on how the integration of additional data sources can improve these methods, e.g. with AgroStac.

- **Initial state:** current crop calendar methods are purely EO-based, i.e. the metrics are extracted directly from the seasonal NDVI profile.
- **Final state:** other information sources will be included as well. These include, but are not limited to, crop type, meteorological information and Sentinel 1 data. Based on this additional information, the improvements in the estimated crop calendar metrics will be evaluated. These include the already operational metrics such as Start of Season, as the newly developed metrics from the previous challenge.
- **Means of evaluation:** comparison of the accuracy of the crop calendar metrics extracted from EO time series, with and without ancillary information available.
- **Final material:** A prototype of the methodology will be ready at the end of sprint 1, which takes full advantage of the different datasets available on the platforms. A report will be written on which ancillary data is beneficial/critical for which crop calendar metric.
- **Milestones**: (1) Pure meteo-based calendars - End of June; (2) Integrated methodology with EO + ancillary information sources - End of September.

S3P2 High PV penetration in urban area DLR part:

Challenge #4: O2,#4 Demonstrated improvement exploiting the wealth of data made available through DIAS, GEOSS platform, Nextgeoss … and other existing hubs or platforms

Improve exploitation of UrbanTep (e.g. use of World Settlement Footprint layers, investigate the possibility of implementing pilot related views/scopes on U-TEP).

- **Initial state:** UrbanTep is available.
- **Final state:** Experience available if pilot related views/scopes can be implemented in U-TEP, if yes, a prototype is available.
- **Means of evaluation:** Prototype or Report if not possible.
- **Milestones:**
  - M1: Concept ready in June 2020.
  - M2: Prototype or report ready in Dec 2020.

S3P2 High PV penetration in urban area DLR part:

Challenge #7: O2, #7 demonstrated compliance with inspire, GEO recommendations interoperability and geo data sharing principles

For the World Settlement Footprint layers we will analyze the possibilities how to improve the compliance with inspire and/or other relevant geo data sharing standards.

- **Initial state:** World Settlement Footprint layers available.
- **Final state:** Experience available if compliance with INSPIRE or other data sharing standards can be improved.
- **Means of evaluation:**
- **Milestones:**
  - M1: Concept ready in June 2020
  - M2: Report ready in Dec 2020

S4P1 mySPACE

Challenge #5: increase in preparedness index for integration into "As A Service (...AAS)" IT infrastructure such as DIAS, NExtGEOSS

- **Initial State:** Building on the H2020 Ecopotential project achievements, mySPACE will extend the approach adopted to quantify changes in a larger ensemble of sites covering different biogeographic regions. At the moment, several services (e.g. Delft 3D, HydroPeriod) and algorithms (e.g. Automatic inundation mapping from Sentinel2 data, DINEOF) exist, all of them with a different maturity level.
- **Final state:** Increase the preparedness index of the advanced open access algorithms (e.g. for hydroperiod calculation and services) and, as a result of Sprint 1, to have products ready to be deployed into infrastructure such as DIAS.
- **Means of evaluation:** Report on the relevant processing procedures
- **Final material to be produced (prototype; demo; video; poster…):** Advanced open access algorithms.
- **Milestone**:

- Service Preparedness for DIAS integration (Dec 2020).
- Clearly identification of user's needs (Dec 2020).

S4P2 mySITE

The development of the mySITE pilot builds on the integration and linking of the existing infrastructure components DEIMS-SDR, eLTER DIP and AgroSense. At the moment, they mainly co-exist independently and are fully operational within their respective usage domain. The main aim of the mySITE activities in Sprint 1 is to integrate these three components into a coherent, distributed system of interrelated services, while interoperability with the other showcase pilots shall be the focus of Sprint 2 activities. DEIMS-SDR and eLTER DIP will serve as metadata and data sources, while AgroSense will serve as data aggregator.

DEIMS-SDR will be extended to a) offer a flexible API for metadata retrieval which will support efficient provision site descriptions and dataset metadata (along with online reference to its data sources) and b) to evaluate the technical integration of additional site descriptions/catalogues such as the Common Database of Designated Areas (CDDA, including the Natura 2000 protected sites).

The AgroSense platform will be adapted to serve as a general platform “EcoSense” to explore in-situ and remote sensing data at research site level. This will enable the dynamic retrieval and display of site information provided by DEIMS-SDR in order to let users select a site of interest and retrieve related metadata on in-situ observations via eLTER-DIP. For data provided by standard services, the in-situ data can subsequently be displayed alongside remote-sensing data products, which at the Sprint 1 stage will consist of existing layers calculated for AgroSense, to be extended to mySPACE data throughout Sprint 2. Based on the planned activities and their outcomes, challenge #4 will be thus addressed by the adoption and adaptation of AgroSense to use the publicly available in-situ data sources from LTER and combine it with Sentinel based data products as well as the evaluation of options to integrate site information from other external site registries. Challenge #7 will be addressed by focusing on the implementation of INSPIRE conforming interfaces and data representations, while challenge #2 shall be achieved by unifying the user base of the three independent components and underlying communities. The main focus will be the extension from a research community based focus to protected area managers, site managers and regional stakeholders (e.g. regional planning authorities). The results of Sprint 1 will be provided in form of a working prototype.

Challenge #4: All pilots should exploit the IT capabilities and the wealth of data made available

- **Initial State:** fully operational but independently existing infrastructure components DEIMS-SDR, eLTER DIP and AgroSense need to be integrated into a coherent, distributed system of interrelated services (interoperability with the other showcase pilots shall be the focus of Sprint 2) (To Be Confirmed).
- **Final state:**
  - Integration and linking of the existing infrastructure components DEIMS-SDR, eLTER DIP and AgroSense to use the publicly available in-situ data sources from LTER and combine it with Sentinel based data products.
  - evaluation of options to integrate site information from other external site registries. (To Be Confirmed).
- **Means of evaluation:** Functional state of mySITE pilot serves as proof-of-concept.
- **Final material to be produced:** provided working prototype.

Challenge #7: Demonstrated compliance with inspire, GEO recommendations interoperability and geo data sharing principles

- **Initial state:** No INSPIRE conforming interfaces and data representations available at the moment (To Be Confirmed).
- **Final state:** Implementation of INSPIRE conforming interfaces and data representations. (To Be Confirmed).
- **Means of evaluation:** Representatives of all pilots cross-check compliance.
- **Final material to be produced (prototype; demo; video; poster…):** Documentation of standards/best practice compliant interfaces will be included in the prototype mentioned under challenge 4.
- **Milestones**:
    - Functional state of the redesigned DEIMS-SDR API (by December 2020).
    - Functional state of the adapted EcoSense platform (by December 2020).

S6P3 Assessing Geo-hazard vulnerability of Cities and Critical Infrastructures

#4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, Nextgeoss, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms

- **Initial state:** The GEP platform allow to process and download massive areas monitored with Sentinel-1. The outputs, consisting of millions of points, are difficult to manage and interpret.
- **Final state:** Semi-automatic methodology to manage and classify the GEP InSAR displacement products will be developed.
- **Materials to be produced:** Pre-analyzed results of the PSBAS-GEP processing over the case study of Murcia and Silesian coal basin.
- **Milestones:** Successful testing of the methodology designed to manage the large results from GEP processing (Jun 2020). Successful testing of the semiautomatic classification of the InSAR possible origin (Dec 2020).

S7P2 Urban resilience to extreme weather

Challenge #6: identify and prepare outsourcing part of processing chain and web service to WekEO infrastructure

- **Initial state:** Service not yet available and implemented on WEkEO, C3S seasonal forecast data not yet accessible from WekEO.
- **Final state:** Interfaces implemented, urban climate service as web service implemented and running on WekEO Server.
- **Mean of evaluation:** Test run of implemented web service.
- **Final material to be produced (prototype; demo; video; poster…):** Web service.
- **Milestone 08/2020:** Access to seasonal forecast in Weenvironment implemented (Jun 2020).

2. JULY 2020

S2P1 EO-based surveillance of Mercury pollution

Challenge #4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus), citizen observatories and any other existing hubs or platforms

Chemical transport model outputs will serve as input to build a statistical emulator exploiting the wealth of data and foster IT capabilities.

- **Initial state:** Chemical Transport Model (CTM) outputs not published.
- **Final state:** CTM outputs published.
- **Means of evaluation:** Number of scenarios (layers) published.
- **Milestone:** Start publishing CTM outputs through the GEOSS Platform and demonstrate wealth of data use, JULY 2020.

S2P2 EO-based surveillance of POPs pollution

Challenge #7: Demonstrated compliance with inspire, GEO recommendations interoperability and geo data sharing principles

- **Initial state:** No compliance with INSPIRE standards, poor visibility of GMP data in GEOSS.
- **Final state:** Data collected within Global Monitoring Plan campaigns are linked to GEOSS.
- **Means of evaluation:** Data are described by standardised metadata sets and are discoverable via GEOSS portal.

S3P3 Merging offshore wind products:

Challenge #4: All pilots should exploit the IT capabilities and the wealth of data made available

- **Initial state:** Currently the existing services use parts of EO data available with specific bottlenecks on processing chains.
- **Final state:** Simplify processing of data and enhance types of data used to derive the final products.
- **Final material:** Webpage with increased functionalities and frequent updates of derived products.
- **Milestones:**
- Enhance existing services with increased functionality features and render them more visible to the public/users (expected by July 2020).
- Develop and validate a unified wind resource product to also be made available as a new feature in the same centralized DTU Wind Energy webpage as the other services (initial development by December 2020).

S4P3 myVARIABLE

myVARIABLE advances the development and user uptake of the Essential Biodiversity Variables (EBV) as a vehicle to promote integration of a disparity of in situ and remote sensing observations in order to deliver comprehensive biodiversity information in space and time. The development EBV-based services to support biodiversity assessments builds on three pillars: (1) Adoption of the EBVs approach by a wider community of biodiversity and data scientists in order to increase the number of compliant datasets; (2)

Taking the GEO BON EBV-Portal into a fully operational infrastructure facilitating access to EBV datasets under FAIR principles and (3) Uptake by user communities involved in biodiversity policy and assessments, facilitating the use of the data through developing a new Information Standard and providing access to basic analysis tools for assessing biodiversity change.

Challenge #4: All pilots should exploit the IT capabilities and the wealth of data made available

- **Initial state:** Certain EBV workflows have been defined for the integration of a disparity of in-situ and remote sensing observations to deliver EBV products but implementation of transparent and reproducible workflows is needed to scale up the EBV concept into full operationalisation and to expand the number of compliant datasets.
- **Final state:** Provide workflows for the production of further EBVs together with derived biodiversity datasets with spatio-temporal continuity at the European scale. These workflows use observations from Sentinel-2 and other remote sensing-based products and multiple sources of in-situ observations (e.g. distributions of species and habitat types).
- **Means of evaluation:** Publication of fully documented and reproducible workflows for at least two Essential Biodiversity Variables developed at the European level.
- **Final material to be produced:** provided working prototype.

Challenge #7: Demonstrated compliance with inspire, GEO recommendations interoperability and geo data sharing principles

- **Initial State**Identification of the need for a new metadata standard to facilitate interoperability among the different EBV datasets and to help users to assess by themselves fit-for-purpose of the different datasets.
- **Final State;**Implementation of a new EBV-specific metadata standard. The standard integrates and promotes the adoption of GEO Data Management Principles in producing biodiversity datasets.
- **Means of evaluation:** Publication of a new EBV metadata standard and implementation of the standard in the GEO BON EBV Portal.
- **Final material to be produced (prototype; demo; video; poster…)** Metadata standard and supporting online completion tool, including guidelines.
- **Milestones**:
  - Implementation of the Minimum Information Standards for promoting compliance with GEO Data Sharing and Data Management Principles and mobilization of further EBV datasets documented according to the EBV-Minimum Information Standards. First operational version of the Standard: July 2020. Final version demonstrated in new EBV datasets: December 2020
  - Increase the number of services to end-users through integration of the different components of the infrastructure (VAT system, GEO server, database infrastructure and Metadata Tool): December 2020

3. AUGUST 2020

S3P2 High PV penetration in urban area ARMINES part

Challenge #5: Pilots ready for integration in AAS IT infrastructure such as DIAS, NextGEOSS (Focus Sprint 1)

- **Initial state:** Use of algorithms, codes, scripts and services in production on Terradue/EGI NextGEOSS platform as the basis for the development of the pilot. Preparedness index as 3 (from 0 to 5).

- **Final state:** Initial remote process (WPS) are accessible for early testing on a DIAS.
- **Means of evaluation:** Get results from a machine-to-machine remote access (WPS) deployed on the DIAS.
- **Milestones:**
    - M11 - First e-shape review meeting: A clear understanding of technical and financial DIAS's offers including specifications, performances, constraints and limitations to support and hosting the pilot.
    - M15 - Initial remote process (WPS) is successfully tested on a DIAS.

S7P4 Hydropower in snow reservoir

> Challenge #6: identify and prepare outsourcing part of processing chain and web service to WekEO infrastructure

- **Initial state:** Hydropower service not yet available as web service; service not yet implemented on WEkEO, instead similar service running on own servers; challenge that C3S seasonal forecast data not accessible from WEkEO; full processing maybe too heavy for WEkEO server.
- **Final state:** Web service is implemented and running on WEkEO infrastructure.
- **Mean of evaluation:** Report on web service implementation.
- **Final material to be produced (prototype; demo; video; poster…):** Web service.

4. SEPTEMBER 2020

S1P1 GEOGLAM

In S1-P1(GEOGLAM), Copernicus data will be used in combination with ancillary datasets (e.g. crop type, soil information, and weather data) to provide detailed crop calendars. Current EO-methods are mainly based on the definition of the start, peak and end of the growing season from the NDVI-profile, and these services will be extended to other parameters such as planting and harvesting date. The first sprint will therefore focus on different aspects:

> Challenge #4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms

Focusing on how the integration of additional data sources can improve these methods, e.g. with AgroStac; (Challenge 4)

- **Initial state:** current crop calendar methods are purely EO-based, i.e. the metrics are extracted directly from the seasonal NDVI profile.
- **Final state:** other information sources will be included as well. These include, but are not limited to, crop type, meteorological information and Sentinel 1 data. Based on this additional information, the improvements in the estimated crop calendar metrics will be evaluated. These include the already operational metrics such as Start of Season, as the newly developed metrics from the previous challenge.
- **Means of evaluation:** comparison of the accuracy of the crop calendar metrics extracted from EO time series, with and without ancillary information available.

- **Final material:** A prototype of the methodology will be ready at the end of sprint 1, which takes full advantage of the different datasets available on the platforms. A report will be written on which ancillary data is beneficial/critical for which crop calendar metric.
- **Milestones**: (1) Pure meteo-based calendars - End of June; (2) Integrated methodology with EO + ancillary information sources - End of September.

Challenge #6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure

- **Initial state:** Development and current deployment of these methods currently happen on local servers. The methodologies developed in the first two challenges will be deployed on several platforms, to evaluate the performance of the different platforms, ease of implementation, accessibility to external data sources, etc.
- **Final state:** Delivery of the prototypes of the crop calendar methodologies that can be deployed on an array of platforms with minimal effort.
- **Means of evaluation:** Performance of the different platforms will be evaluated on: (i) available information, (ii) timeliness of this availability for NRT applications, (iii) pricing, (iv) ease of deployment of the code, and (v) processing efficiency.
- **Final material:** Report containing the results of the comparison, highlighting which platforms are suitable for the operational deployment of the crop calendar methodologies, including potential bottlenecks and recommendations.
- **Milestones:** (1) Full implementation on 1 platform (probably NextGEOSS) - End of September; (2) translation of workflow to other platforms - End of November.

S2P1 EO-based surveillance of Mercury pollution

Challenge #2: Increase in the variety of users targeted by the designed service

- **Initial state:** Draft UI.
- **Final state:** Running UI developed according to Parties and NGOs feedbacks.
- **Means of evaluation:** Number of Parties and NGOs involved.
- **Milestones:** Design and deploy a co-designed application in support of the effectiveness evaluation of the Convention, 1st revision (September 2020).

S2P3 EO-based pollution-health risks profiling in the urban environment

Challenge #5: Increase in preparedness index for integration into AAS IT infrastructure such as DIAS, NextGEOSS, etc.

- **Initial state:** Building the concept of pilot services, the details of which will point us towards identifying the correct platform (wanting input from e-shape to help identify platform, both for technical and commercial purposes).
- **Final state:** Find/select an appropriate IT infrastructure/platform to host the pilot service.
- **Means of evaluation:** Operationality /usability of the final service; users' engagement/feedback with service.
- **Milestones:** Platform selection (September 2020).

S7P5 Seasonal Preparedness

Challenge #6: Identify and prepare outsourcing part of processing chain and web service to WekEO infrastructure

- **Initial state:** Service not yet implemented and available on WEkEO, C3S seasonal forecast data and ECMWF ERF data not yet accessible from WekEO.
- **Final state**: Seasonal preparedness service implemented and running on WekEO Server.
- **Means of evaluation:** Report on web service implementation.
- **Final material to be produced (prototype; demo; video; poster…):** Web service.
- **Milestone:** Report on interface test and implementation of web service (Sep 2020).

5. OCTOBER 2020

S3P1 NextSENSE Solar Energy nowcasting and short-term forecasting system

Challenge #4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus), citizen observatories and any other existing hubs or platforms.

- **Initial state:** SENSE implementations disseminated and made open access through the Geo-Cradle's regional datahub.
- **Final state:** During sprint one nextSENSE services and outputs to be accessible and fully exploitable through the GEO-Cradle related datahub.
- **Means of evaluation:** Internal evaluation of web service. Input from existing linked end-users.
- **Milestone:** Online services and databases in terms of static and dynamic solar energy applications exploiting the nextSENSE and Copernicus capabilities (October 2020).

6. NOVEMBER 2020

S1P1 GEOGLAM

In S1-P1(GEOGLAM), Copernicus data will be used in combination with ancillary datasets (e.g. crop type, soil information, and weather data) to provide detailed crop calendars. Current EO-methods are mainly based on the definition of the start, peak and end of the growing season from the NDVI-profile, and these services will be extended to other parameters such as planting and harvesting date. The first sprint will therefore focus on different aspects:

Challenge #6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure

- **Initial state:** Development and current deployment of these methods currently happen on local servers. The methodologies developed in the first two challenges will be deployed on several platforms, to evaluate the performance of the different platforms, ease of implementation, accessibility to external data sources, etc.
- **Final state:** Delivery of the prototypes of the crop calendar methodologies that can be deployed on an array of platforms with minimal effort.

- **Means of evaluation:** Performance of the different platforms will be evaluated on: (i) available information, (ii) timeliness of this availability for NRT applications, (iii) pricing, (iv) ease of deployment of the code, and (v) processing efficiency.
- **Final material:** Report containing the results of the comparison, highlighting which platforms are suitable for the operational deployment of the crop calendar methodologies, including potential bottlenecks and recommendations.
- **Milestones:** (1) Full implementation on 1 platform (probably NextGEOSS) - End of September; (2) translation of workflow to other platforms - End of November.

S5P4 Sargassum detection for seasonal planning

challenge #4: O2-1: Exploit IT capabilities and wealth of data

- **Initial state:** Existing operational chain used CLS infrastructure and own tools for processing and archiving.
- **Final state:** To produce a reanalysis of Sargassum detection using Sentinel-3 and MODIS data.
- **Means of evaluation:** compute the reanalysis using a DIAS infrastructure- November 2020.
- **Final material:** a one-year reanalysis of Sargassum index on S3 -Modis.

S5P5 Monitoring fishing activity

Challenge #4 Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms

- **Initial state:** The current version of the web based tool was developed in the scope of BIOMETORE and Seabiodata and is running on an IT infrastructure at IPMA headquarters
- **Final State**: To have the new version of the web application deployed in NextGEOSS and linked with their catalogue, ready to take advantage of the harvested CMEMS datasets (SST, Chlorophyl concentration, etc) in the next development sprints.
- **Means of evaluation**: To have the new version of the web application deployed in NextGEOSS - November 2020.
- **Final material to be produced (prototype; demo; video; poster…)**: Web application online and working pre-operationally.

7. DECEMBER 2020

S1P2 EU-CAP_Support

In S1-P2 (EU-CAP), Copernicus data will be used in combination with ancillary datasets (e.g. soil maps, weather data, LPIS, crop calendars) to extract phenological stages and estimate crop yield for cotton at three different levels, at national, at regional and at local scale. The aforementioned products have been identified as critical services missing from the gaiasense solution, on which this pilot builds upon. Additionally, advanced EO techniques and machine learning pipelines will be incorporated to enhance the existing services of the gaiasense platform. The first sprint will focus on the following:

Challenge #4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms

Integrating ancillary data from additional data sources of GEOS platforms (Challenge 4)

- **Initial state:** Exploring the relevant existing platforms such as the GAIASENSE smart farming system in terms of content, architecture, spatial and temporal resolution, interoperability. Current crop growth stages are delivered exclusively through the seasonal NDVI profile (Sentinel-2).
- **Final state:** More information sources will be included to provide a variety of data. Integration of the various EO and meteorological datasets.
    a. Use and extend and in-house (NOA) umbrella API that connects to multiple Sentinel Hubs (DIAS, Open Access Hub, Hellenic mirror site) acting as a single access point for all Copernicus missions' data.
    b. GEO-CRADLE database: Data libraries provided by Regional Data Hub (RDH) and delivered from "Improved Food Security – Water Extremes Management (IFS)" will be used. The soil spectral libraries of RDH will be explored, in cooperation with partner I-BEC, to produce soil maps, through fusion with Sentinel-2 data
- **Means of evaluation:** For 1. Showcase with appropriate metrics the enhancement in a) data availability, b) latency and c) download speed when using the umbrella API versus the Copernicus Open Access Hub. For 2. Enriched system with more datasets.
- **Final material:** A prototype of the methodology will be generated at the end of sprint 1, utilizing to some extent the aforementioned datasets.
- **Milestones:**
    - Sprint interim assessment: M11 Apr 2020. Progress in parallel for the two services of phenology extraction (towards working prototype) and yield estimation (towards defining a complete methodological design), final specifications following the co-designers' requirements.
    - End Sprint 1: M20 Dec 2020. 1st working prototype of phenology extraction in Level-1 and Level-2 (that is national and regional scale) and completed design for yield estimation in Level-1 and Level-2 (its implementation to follow in Sprint 2).

S1P2 EU-CAP_Support

In S1-P2 (EU-CAP), Copernicus data will be used in combination with ancillary datasets (e.g. soil maps, weather data, LPIS, crop calendars) to extract phenological stages and estimate crop yield for cotton at three different levels, at national, at regional and at local scale. The aforementioned products have been identified as critical services missing from the GAIASENSE solution, on which this pilot builds upon. Additionally, advanced EO techniques and machine learning pipelines will be incorporated to enhance the existing services of the gaiasense platform. The first sprint will focus on the following:

Challenge #4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms

Integrating ancillary data from additional data sources of GEOS platforms (Challenge 4)

- **Initial state:** Exploring the relevant existing platforms such as the GAIASENSE smart farming system in terms of content, architecture, spatial and temporal resolution, interoperability. Current crop growth stages are delivered exclusively through the seasonal NDVI profile (Sentinel-2).

- **Final state:** More information sources will be included to provide a variety of data. Integration of the various EO and meteorological datasets.
    a. Use and extend and in-house (NOA) umbrella API that connects to multiple Sentinel Hubs (DIAS, Open Access Hub, Hellenic mirror site) acting as a single access point for all Copernicus missions' data.
    b. GEO-CRADLE database: Data libraries provided by Regional Data Hub (RDH) and delivered from "Improved Food Security – Water Extremes Management (IFS)" will be used. The soil spectral libraries of RDH will be explored, in cooperation with partner I-BEC, to produce soil maps, through fusion with Sentinel-2 data
- **Means of evaluation:** For 1. Showcase with appropriate metrics the enhancement in a) data availability, b) latency and c) download speed when using the umbrella API versus the Copernicus Open Access Hub. For 2. Enriched system with more datasets.
- **Final material:** A prototype of the methodology will be generated at the end of sprint 1, utilizing to some extent the aforementioned datasets.

Milestones: MILESTONE 1: Sprint interim assessment: M11 Apr 2020. Progress in parallel for the two services of phenology extraction (towards working prototype) and yield estimation (towards defining a complete methodological design), final specifications following the co-designers' requirements. MILESTONE 2: End Sprint 1: M20 Dec 2020. 1st working prototype of phenology extraction in Level-1 and Level-2 (that is national and regional scale) and completed design for yield estimation in Level-1 and Level-2 (its implementation to follow in Sprint 2).

S1P4 Agro-industry

The starting point for Pilot 4 is the existing WatchItGrow (WIG) platform, which provides EO-based information to the potato growers and -industry. In the first sprint, the focus will be on extending these services to other crops and users. Key aspect will be to properly understand the specific needs of these users, and the development of new services that correspond to those different needs. In this regard, a co-design approach will be essential, where the new services will be developed in close collaboration with a select number of new potential users. The different tasks for the first sprint can be categorized as following:

Challenge #5: Increase in preparedness index for integration into AAS IT infrastructure such as DIAS, NextGEOSS, etc.

In addition to the development of the new service as stipulated in the previous challenges, there will also be a focus on integrating components of the existing services on different platforms. Currently, all services are run in-house as the current focus is on Belgian end-users. However, with the foreseen expansion to other areas, a more agile set-up is needed, for which a transfer to online platforms is needed (challenge 5).

- **Initial state:** Current services are run in-house, including sentinel data download and pre-processing. Preparedness Index is thus 0.
- **Final state**: current services and workflow components, especially those that will be needed for the new services foreseen in challenge 1, will be transferred to one of the mentioned platforms. Preparedness Index: 3 (prototype in an operational environment).
- **Means of evaluation: -**
- **Final material:** Operational services from WIG running on one of the platforms.
- **Milestones:**

- May 2020: identification of the platform to be used (DIAS, NextGEOSS,…).
- December 2020: services to be transferred are operational on the platform.

S1P4 Agro-industry Sprint 1 Challenges:

The starting point for Pilot 4 is the existing WatchItGrow (WIG) platform, which provides EO-based information to the potato growers and -industry. In the first sprint, the focus will be on extending these services to other crops and users. Key aspect will be to properly understand the specific needs of these users, and the development of new services that correspond to those different needs. In this regard, a co-design approach will be essential, where the new services will be developed in close collaboration with a select number of new potential users. The different tasks for the first sprint can be categorized as following:

Challenge #1: increase number of user-oriented services

- **Initial state:** Current services are focused on the potato growers (e.g. fertilization advice, yield prediction,…).
- **Final state:** The new user needs identified in challenge 2, will be translated into new services through a co-design approach (challenge 3). At the end of sprint 1, at least one extra service will be added. If needed, existing services will be modified to the new user groups (e.g. fertilization advice).
- **Means of evaluation: -**
- **Final material:**at least one additional service added to the WIG platform, which will not be focused on the potato industry.
- **Milestones:**June 2020: first prototype of new service, to be evaluated by new users; October 2020: final version of new service, to be implemented in WIG as operational service.

S2P1 EO-based surveillance of Mercury pollution

Challenge #2: Increase in the variety of users targeted by the designed service

- **Initial state:** Final UI.
- **Final state:** Running UI developed according to Parties and NGOs feedbacks.
- **Means of evaluation:** Number of Parties and NGOs involved.
- **Milestones:** Design and deploy a co-designed application in support of the effectiveness evaluation of the Convention, Final version (December 2020).

Challenge #9: Increase number of user communities involved (non partners)

- **Initial state:** ECHMERIT-Hg CTM used to produce outputs used for assessments.
- **Final state:** Multi-model and multi-database runs to produce outputs.
- **Means of evaluation:** Number of models and Hg emission databases adopted.
- **Milestones:** Run of models (developed by different communities) by adopting different databases (developed by different communities) (December 2020).

S3P2 High PV penetration in urban area ARMINES part

Challenge #6: Usage of the DIAS (Focus Sprint 1)

- **Initial state:** DIAS's offers are identified in addition and support from WP2 (Co-design analisys) and WP3 (Initial assessment). This will help to define the proper strategy for outsourcing the process chain on the DIAS.
- **Final state:** Initial elements of the prototype including additional key needed components (Storage, availability, needed libraries, Web-based client support including JupyterHub, Lab, Notebook,...) from the DIAS offers are in place for initial testing.
- **Means of evaluation:** Get results from initial WPS based on access from Jupyter Web client deployed on the DIAS.
- **Milestones:**
    - M20 - End of sprint 1: Initial testing of DIAS including WPS, and additional needed components are successfully tested.

S3P2 High PV penetration in urban area (DLR part)

We reviewed your KPIs and found several of them as not being appropriate to our pilot (marked as N/A), others becoming active only later (marked as N/A yet) and 3 are left which are our focus now in Sprint 1. Please find a short description what that means for us in detail.

Challenge #4: O2,#4 Demonstrated improvement exploiting the wealth of data made available through DIAS, GEOSS platform, Nextgeoss … and other existing hubs or platforms

Improve exploitation of UrbanTep (e.g. use of World Settlement Footprint layers, investigate the possibility of implementing pilot related views/scopes on U-TEP).

- **Initial state:** UrbanTep is available.
- **Final state:** Experience available if pilot related views/scopes can be implemented in U-TEP, if yes, a prototype is available.
- **Means of evaluation:** Prototype or Report if not possible.
- **Milestones:**
    - M1: Concept ready in June 2020.
    - M2: Prototype or report ready in Dec 2020.

S3P2 High PV penetration in urban area DLR part:

We reviewed your KPIs and found several of them as not being appropriate to our pilot (marked as N/A), others becoming active only later (marked as N/A yet) and 3 are left which are our focus now in Sprint 1. Please find a short description what that means for us in detail.

Challenge #7: O2, #7 demonstrated compliance with inspire, GEO recommendations interoperatbility and geo data sharing principles

For the World Settlement Footprint layers we will analyze the possibilities how to improve the compliance with inspire and/or other relevant geo data sharing standards.

- **Initial state:** World Settlement Footprint layers available.
- **Final state:** Experience available if compliance with INSPIRE or other data sharing standards can be improved.

- **Means of evaluation:**
- **Milestones:**
  - M1: Concept ready in June 2020
  - M2: Report ready in Dec 2020

S3P3 Merging offshore wind products:

Challenge #4: All pilots should exploit the IT capabilities and the wealth of data made available

- **Initial state:** Currently the existing services use parts of EO data available with specific bottlenecks on processing chains.
- **Final state:** Simplify processing of data and enhance types of data used to derive the final products.
- **Final material:** Webpage with increased functionalities and frequent updates of derived products.
- **Milestones:**
  - Enhance existing services with increased functionality features and render them more visible to the public/users (expected by July 2020).
  - Develop and validate a unified wind resource product to also be made available as a new feature in the same centralized DTU Wind Energy webpage as the other services (initial development by December 2020).

S4P1 mySPACE

Challenge #5: increase in preparedness index for integration into "As A Service (...AAS)" IT infrastructure such as DIAS, NextGEOSS

- **Initial State:** Building on the H2020 Ecopotential project achievements, mySPACE will extend the approach adopted to quantify changes in a larger ensemble of sites covering different biogeographic regions. At the moment, several services (e.g. Delft 3D, HydroPeriod) and algorithms (e.g. Automatic inundation mapping from Sentinel2 data, DINEOF) exist, all of them with a different maturity level.
- **Final state:** Increase the preparedness index of the advanced open access algorithms (e.g. for hydroperiod calculation and services) and, as a result of Sprint 1, to have products ready to be deployed into infrastructure such as DIAS.
- **Means of evaluation:** Report on the relevant processing procedures
- **Final material to be produced (prototype; demo; video; poster…):**Advanced open access algorithms.
- **Milestones**:
  - Service Preparedness for DIAS integration (Dec 2020).
  - Clearly identification of user's needs (Dec 2020).

S4P2 mySITE

The development of the mySITE pilot builds on the integration and linking of the existing infrastructure components DEIMS-SDR, eLTER DIP and AgroSense. At the moment, they mainly co-exist independently and are fully operational within their respective usage domain. The main aim of the mySITE activities in Sprint 1 is to integrate these three components into a coherent, distributed system of interrelated services, while interoperability with the other showcase pilots shall be the focus of Sprint 2 activities. DEIMS-SDR and eLTER DIP will serve as metadata and data sources, while AgroSense will serve as data aggregator.

DEIMS-SDR will be extended to a) offer a flexible API for metadata retrieval which will support efficient provision site descriptions and dataset metadata (along with online reference to its data sources) and b) to evaluate the technical integration of additional site descriptions/catalogues such as the Common Database of Designated Areas (CDDA, including the Natura 2000 protected sites).

The AgroSense platform will be adapted to serve as a general platform "EcoSense" to explore in-situ and remote sensing data at research site level. This will enable the dynamic retrieval and display of site information provided by DEIMS-SDR in order to let users select a site of interest and retrieve related metadata on in-situ observations via eLTER-DIP. For data provided by standard services, the in-situ data can subsequently be displayed alongside remote-sensing data products, which at the Sprint 1 stage will consist of existing layers calculated for AgroSense, to be extended to mySPACE data throughout Sprint 2. Based on the planned activities and their outcomes, challenge #4 will be thus addressed by the adoption and adaptation of AgroSense to use the publicly available in-situ data sources from LTER and combine it with Sentinel based data products as well as the evaluation of options to integrate site information from other external site registries. Challenge #7 will be addressed by focusing on the implementation of INSPIRE conforming interfaces and data representations, while challenge #2 shall be achieved by unifying the user base of the three independent components and underlying communities. The main focus will be the extension from a research community based focus to protected area managers, site managers and regional stakeholders (e.g. regional planning authorities). The results of Sprint 1 will be provided in form of a working prototype.

Challenge #4: All pilots should exploit the IT capabilities and the wealth of data made available

- **Initial State:** fully operational but independently existing infrastructure components DEIMS-SDR, eLTER DIP and AgroSense need to be integrated into a coherent, distributed system of interrelated services (interoperability with the other showcase pilots shall be the focus of Sprint 2) (To Be Confirmed).
- **Final state:**
    - Integration and linking of the existing infrastructure components DEIMS-SDR, eLTER DIP and AgroSense to use the publicly available in-situ data sources from LTER and combine it with Sentinel based data products.
    - evaluation of options to integrate site information from other external site registries.(To Be Confirmed).
- **Means of evaluation:** Functional state of mySITE pilot serves as proof-of-concept.
- **Final material to be produced:** provided working prototype.

Challenge #7: Demonstrated compliance with inspire, GEO recommendations interoperability and geo data sharing principles

- **Initial state:** No INSPIRE conforming interfaces and data representations available at the moment (To Be Confirmed).
- **Final state:** implementation of INSPIRE conforming interfaces and data representations. (To Be Confirmed).
- **Means of evaluation:** Representatives of all pilots cross-check compliance.
- **Final material to be produced (prototype; demo; video; poster…):** Documentation of standards/best practice compliant interfaces will be included in the prototype mentioned under challenge 4.
- **Milestone**:
    - Functional state of the redesigned DEIMS-SDR API (by December 2020).
    - Functional state of the adapted EcoSense platform (by December 2020).

S4P3 myVARIABLE

myVARIABLE advances the development and user uptake of the Essential Biodiversity Variables (EBV) as a vehicle to promote integration of a disparity of in situ and remote sensing observations in order to deliver comprehensive biodiversity information in space and time. The development EBV-based services to support biodiversity assessments builds on three pillars: (1) Adoption of the EBVs approach by a wider community of biodiversity and data scientists in order to increase the number of compliant datasets; (2) Taking the GEO BON EBV-Portal into a fully operational infrastructure facilitating access to EBV datasets under FAIR principles and (3) Uptake by user communities involved in biodiversity policy and assessments, facilitating the use of the data through developing a new Information Standard and providing access to basic analysis tools for assessing biodiversity change.

Challenge #4: All pilots should exploit the IT capabilities and the wealth of data made available

- **Initial state:** Certain EBV workflows have been defined for the integration of a disparity of in-situ and remote sensing observations to deliver EBV products but implementation of transparent and reproducible workflows is needed to scale up the EBV concept into full operationalisation and to expand the number of compliant datasets.
- **Final state:** Provide workflows for the production of further EBVs together with derived biodiversity datasets with spatio-temporal continuity at the European scale. These workflows use observations from Sentinel-2 and other remote sensing-based products and multiple sources of in-situ observations (e.g. distributions of species and habitat types).
- **Means of evaluation:** Publication of fully documented and reproducible workflows for at least two Essential Biodiversity Variables developed at the European level.
- **Final material to be produced:** provided working prototype.

Challenge #7: Demonstrated compliance with inspire, GEO recommendations interoperability and geo data sharing principles

- **Initial State:** Identification of the need for a new metadata standard to facilitate interoperability among the different EBV datasets and to help users to assess by themselves fit-for-purpose of the different datasets.
- **Final State:** Implementation of a new EBV-specific metadata standard. The standard integrates and promotes the adoption of GEO Data Management Principles in producing biodiversity datasets.
- **Means of evaluation:** Publication of a new EBV metadata standard and implementation of the standard in the GEO BON EBV Portal.
- **Final material to be produced (prototype; demo; video; poster…)** Metadata standard and supporting online completion tool, including guidelines.
- **Milestones**:
    - Implementation of the Minimum Information Standards for promoting compliance with GEO Data Sharing and Data Management Principles and mobilization of further EBV datasets documented according to the EBV-Minimum Information Standards. First operational version of the Standard: July 2020. Final version demonstrated in new EBV datasets: December 2020
    - Increase the number of services to end-users through integration of the different components of the infrastructure (VAT system, GEO server, database infrastructure and Metadata Tool): December 2020

S5P2 Satellite Earth Observation-derived water bodies and floodwater record over Europe

Challenge #6: Usage of the DIAS

- **Initial state:** We have currently three services implemented on the DIAS: i) an 'on demand' flood mapping service based on Envisat data (platform: ESA GPOD), ii) an 'on demand' flood mapping service based on Sentinel-1 data (platform: ESA GPOD, WASDI, Hydrology TEP) and iii) a systematic Sentinel-1 based flood mapping service covering three countries in SE Asia (platform: WASDI).
- **Final state:** We are planning to setup a new systematic Sentinel-1 based flood mapping service over Europe on NextGEOSS.
- **Means of evaluation**: The Sentinel-1 image archive over Europe (2012-present) can be processed with our software implemented on NextGEOSS.
- **Final material:** The processing chain is implemented on NextGEOSS and used to generate the flood record of Europe (including the generation of derived products defined under Challenge#3) . By the end of sprint 1 we plan to have a DIAS-generated flood record available for selected test areas over Europe.
- **Milestone:** our software should be implemented on nextGeoss halfway through the sprint so that after initial testing the data processing can start at the end of the sprint.

S5P3 Diver Information on Visibility in Europe

Challenge #6: Usage of the DIAS

- **Initial state:** Currently the processing is done ad-hoc and locally at PML's premises. Data services are also hosted at PML for use within the App.
- **Final state:** We would really like to be able to move not only our data processing to the "cloud" or onto a DIAS platform we would also like to host of data services their two. This would, in theory, give us greater resilience to an increase in users as well as service stability.
- **Means of evaluation**: Our data processing is done on a/the selected DIAS platform, web services (possible WMS, WFS & WCS) are hosted and served from within the DIAS and consumed by the App.
- **Final material:** The ability to process data and server web services from a DIAS, although this will be dependent of
- **Milestone:** At the halfway point of the sprint, we would like to have at a minimum a dockerised (or other container system) version of our processing running on a DIA with access to the required data from CMEMS, this will be followed up with the creation of web services for the final milestone at the end of the sprint.

S6P2 GEOSS for Disasters in Urban Environment Sprint 1 Challenge

Challenge #4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, Nextgeoss, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms

- **Initial state:** The EO Sentinel data are downloaded manually for each research experiment.
- **Current status:** Automatic procurement of Sentinel-1 GRD products and Sentinel-2 level 2 product already implemented during the first part of the project from Copernicus Open Access Hub over the Italian territory. Automatic calculation of NDVI from Sentinel-2 level 2 products already implemented with calibration and geocoding of the downloaded variables.

- **Final status:** Automatic procurement of all variables needed by the hydro/fire- meteorological chain implemented with calibration and geocoding of all the downloaded variables over the Italian territory. Automatic calculation of Soil Moisture from Sentinel-1 GRD products.
- **Milestones**:
    - Milestone 1: M11 - Successful testing of daily operationally automatic download for GRD and NDVI over Italy.
    - Milestone 2: M20 - Successful testing of daily operationally automatic download for all variables needed over Italy.
- **Final material:** Report about the scripts functioning for the automatic procurement, calibration and geocoding of the aforementioned Sentinel variables.

S6P3 Assessing Geo-hazard vulnerability of Cities and Critical Infrastructures

Challenge #4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, Nextgeoss, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms

- **Initial state:** The GEP platform allow to process and download massive areas monitored with Sentinel-1. The outputs, consisting of millions of points, are difficult to manage and interpret.
- **Final state:** Semi-automatic methodology to manage and classify the GEP InSAR displacement products will be developed.
- **Materials to be produced:** Pre-analyzed results of the PSBAS-GEP processing over the case study of Murcia and Silesian coal basin.
- **Milestones:** Successful testing of the methodology designed to manage the large results from GEP processing (Jun 2020). Successful testing of the semiautomatic classification of the InSAR possible origin (Dec 2020).

S6P4 Resilient and Sustainable ecosystems including Agriculture and food

Challenge #4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, Nextgeoss, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms

- **Initial state:** Exploring the relevant existing platforms such as the GAIASENSE smart farming system in terms of content, architecture, spatial and temporal resolution, interoperability.
- **Final state:** Integration and homogenisation of the various EO and meteorological datasets (multiple time scales, spatial extents, grid resolutions, blending gridded with point data), statistical analysis, extraction of the critical climatological indices for the selected crop type (cotton) over the area of study (Rodopi, Greece), and improvement of the spatial resolution where necessary. Use and extend the in-house (NOA) umbrella API that connects to multiple Sentinel Hubs (DIAS, Open Access Hub, Hellenic mirror site) acting as a single access point for all Copernicus missions' data.
- **Means of evaluation:** Enriched system with more datasets.
- **Final material to be produced:**
- **Milestones:**
    - **Sprint interim assessment:** M11 Apr 2020. Progress in parallel for all 4 services, final specifications following the co-designer's requirements.

- **M20 Dec 2020**. Prototype for 3 of 4 services.

S5P1 Improved historical water availability and quality information service

Challenge #6: Usage of EO processing chain in the DIAS infrastructure

- **Initial state:** Currently the processing of EO data is done ad-hoc and locally at SMHI infrastructure. Data storages are also hosted at SMHI for use within the services.
- **Final state:** We would really like to be able to operationally fetch (e.g. on a daily/weekly/monthly base) updated data and use the DIAS platform to post-process them for preparation in our services.
- **Means of evaluation**: Availability of a prototype in which our data processing is done on the DIAS platform.
- **Final material:** The ability to process EO data and server web services from a DIAS.
- **Milestone:** At the end of the sprint, we would like to have a prototype of our post-processing running on DIAS with access to the required EO data.

6. ANNEX 2: SHOWCASE'S INFRASTRUCTURE DIAGRAMS, PILOT'S EXPECTATIONS AFTER INITIAL ASSESSMENT AND MAPPING OF THE SELECTED CHALLENGES FOR SPRINT 1

8. S1 - Agriculture

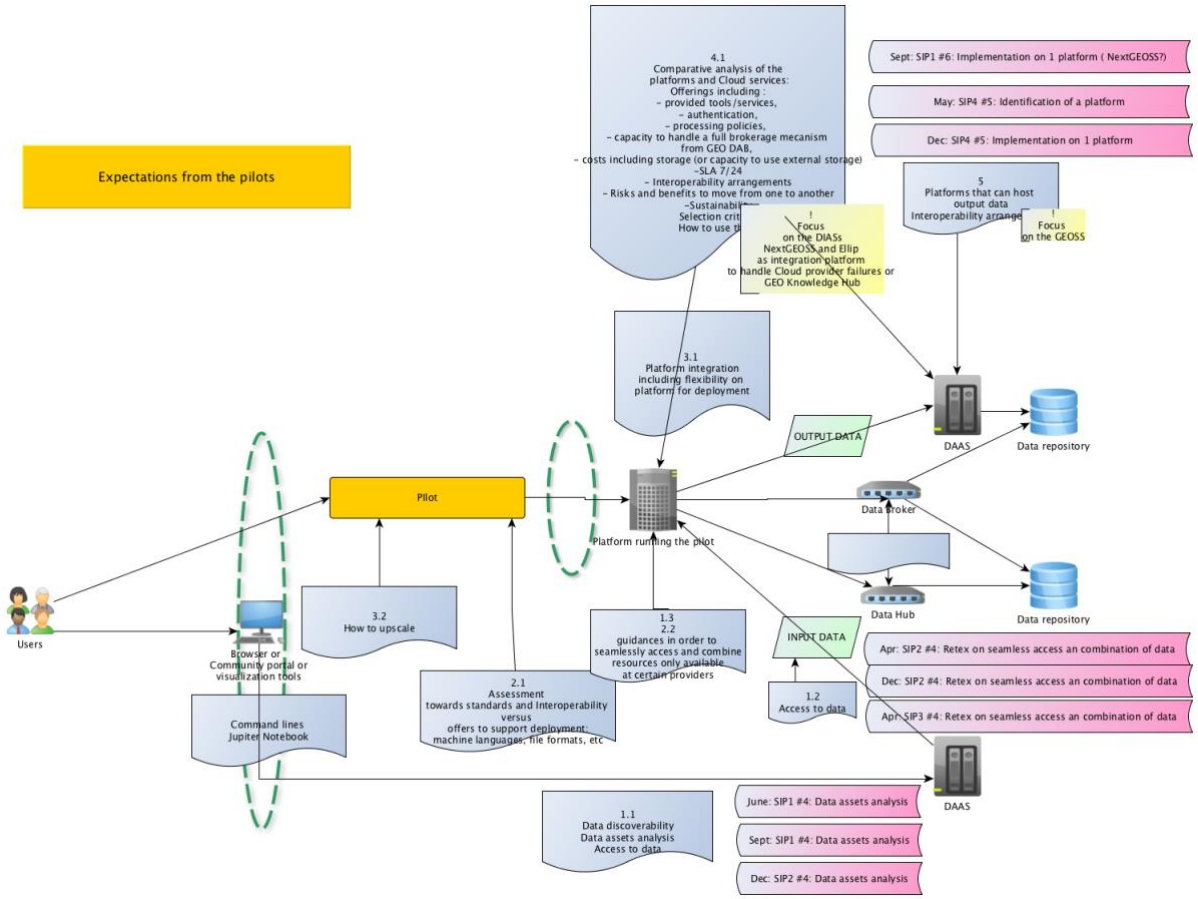

Figure 5: Agriculture Showcase. Focus of the pilots and expectations of WP3 from the pilots mapped into the conceptual workflow. The blue documents list the issues on which the pilots have expressed expectations of support from WP3. The pink containers identify focus of work of the pilots and the expectations of return of experience from WP3.

9. S2 - Health

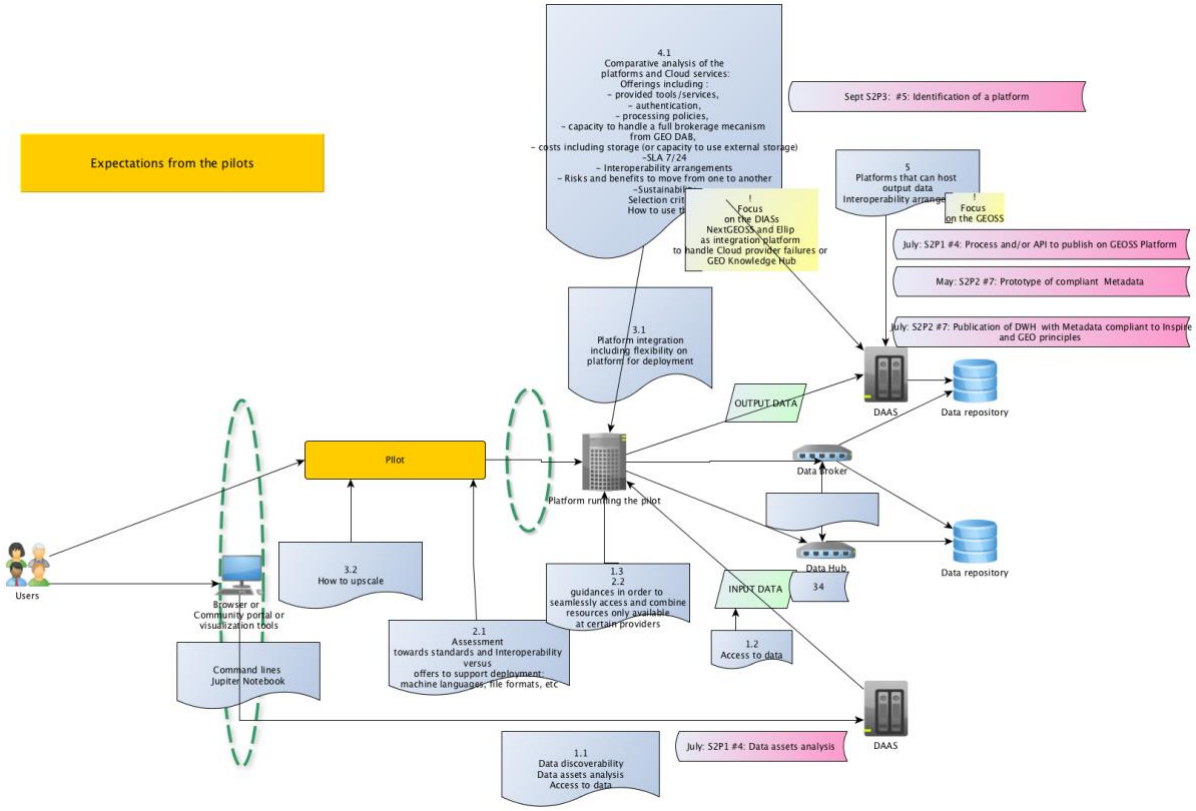

Figure 6: Health Showcase. Focus of the pilots and expectations of WP3 from the pilots mapped into the conceptual workflow. The blue documents list the issues on which the pilots have expressed expectations of support from WP3. The pink containers identify focus of work of the pilots and the expectations of return of experience from WP3.

10. S3 - Energy

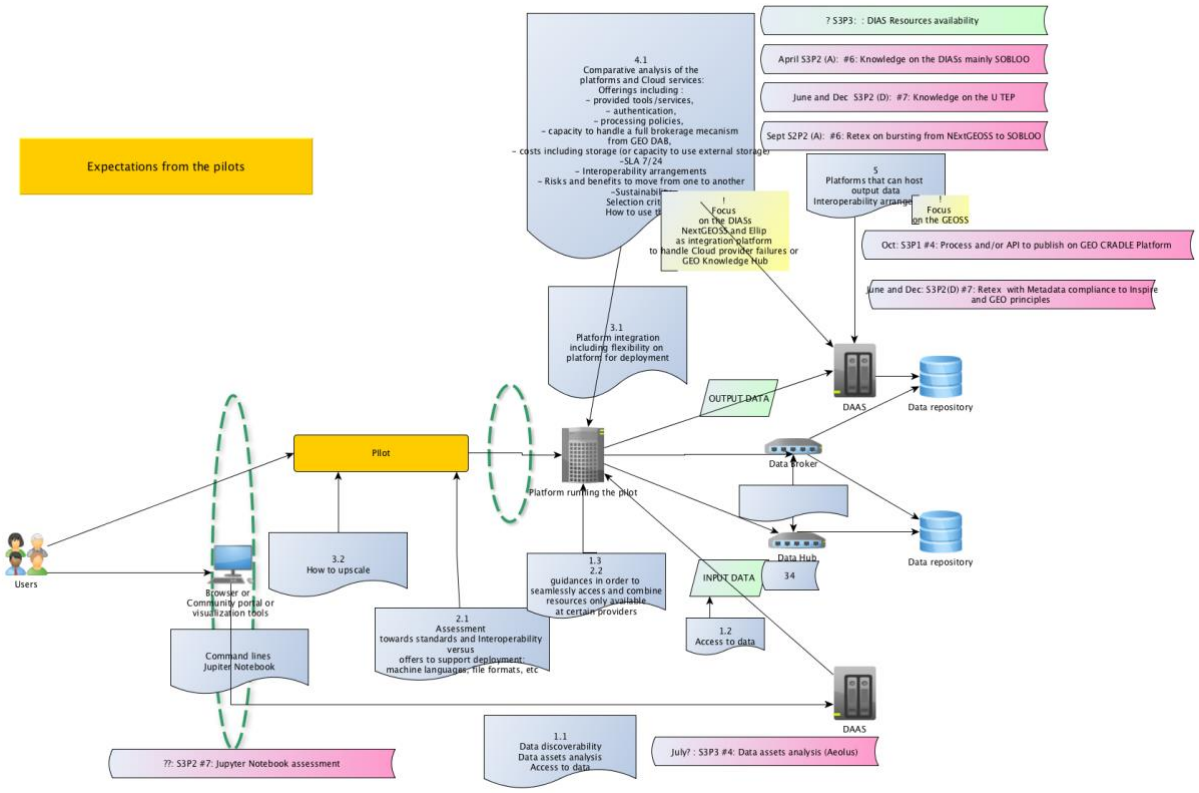

Figure 7: Energy Showcase. Focus of the pilots and expectations of WP3 from the pilots mapped into the conceptual workflow. The blue documents list the issues on which the pilots have expressed expectations of support from WP3. The pink containers identify focus of work of the pilots and the expectations of return of experience from WP3.

11. S4 - Biodiversity

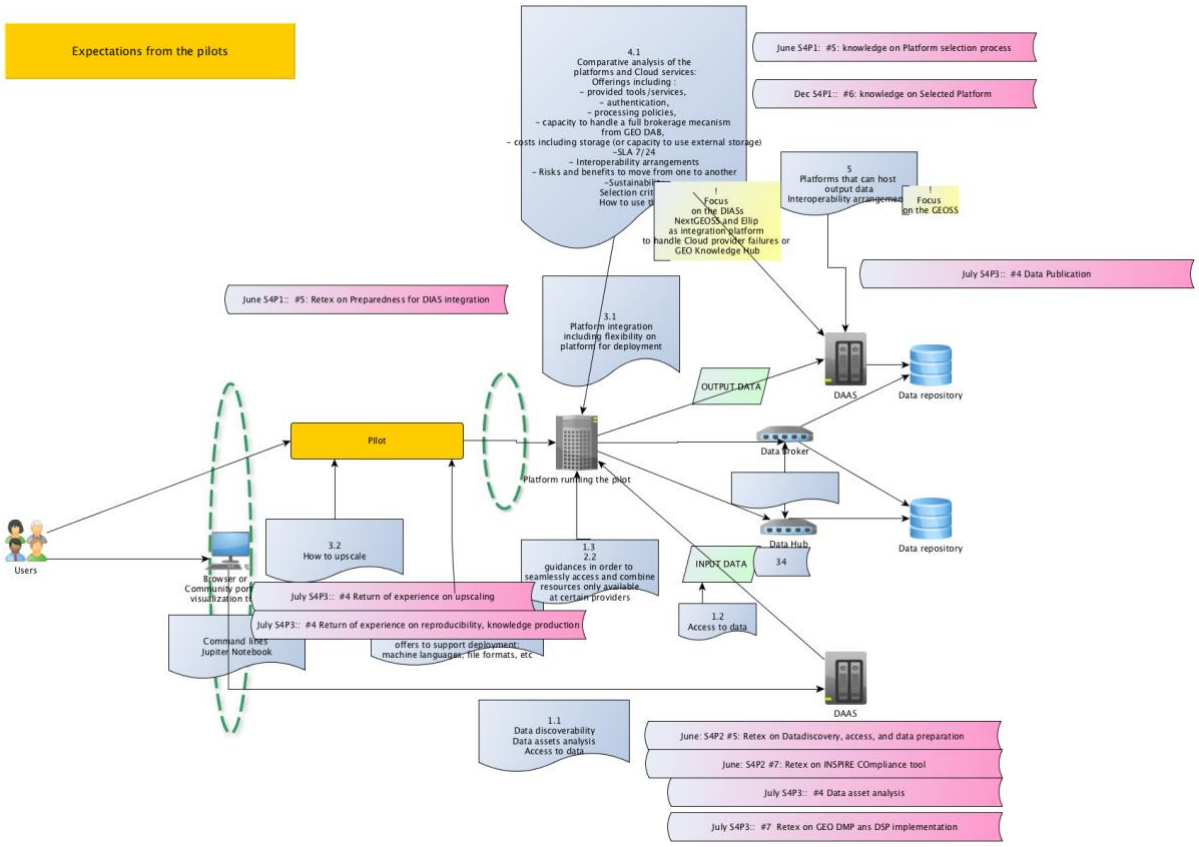

Figure 8: Biodiversity Showcase. Focus of the pilots and expectations of WP3 from the pilots mapped into the conceptual workflow. The blue documents list the issues on which the pilots have expressed expectations of support from WP3. The pink containers identify focus of work of the pilots and the expectations of return of experience from WP3.

12. S5 - Water

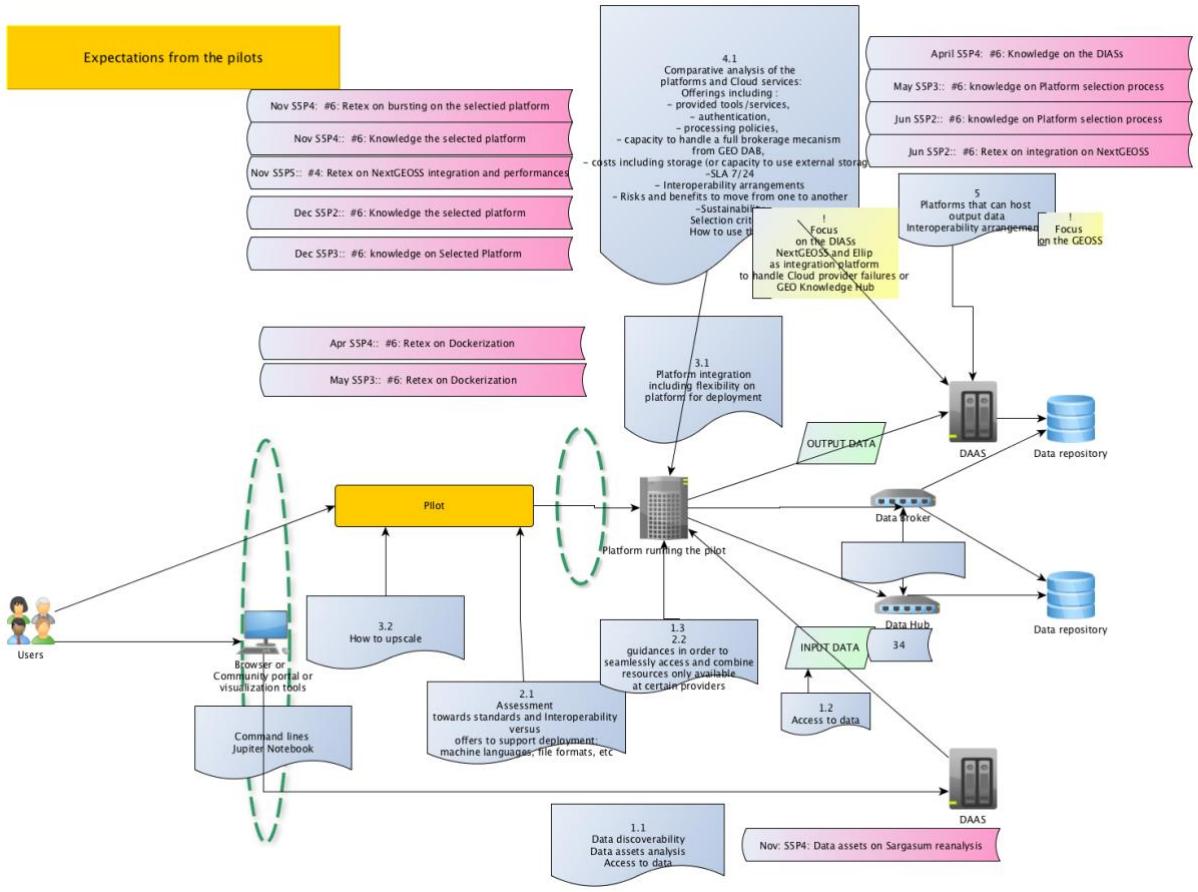

Figure 9: Water Showcase. Focus of the pilots and expectations of WP3 from the pilots mapped into the conceptual workflow. The blue documents list the issues on which the pilots have expressed expectations of support from WP3. The pink containers identify focus of work of the pilots and the expectations of return of experience from WP3.

13. S6 - Disaster

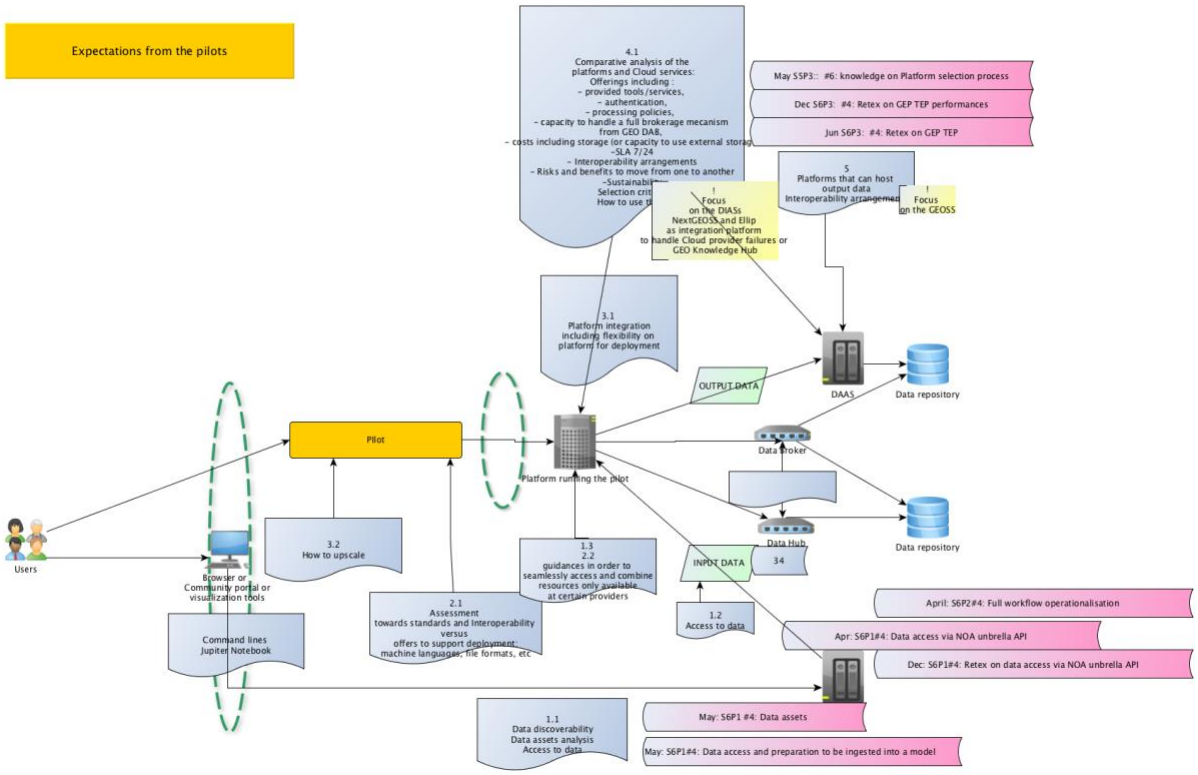

Figure 10: Disaster Showcase. Focus of the pilots and expectations of WP3 from the pilots mapped into the conceptual workflow. The blue documents list the issues on which the pilots have expressed expectations of support from WP3. The pink containers identify focus of work of the pilots and the expectations of return of experience from WP3.

14. S7 - Climate

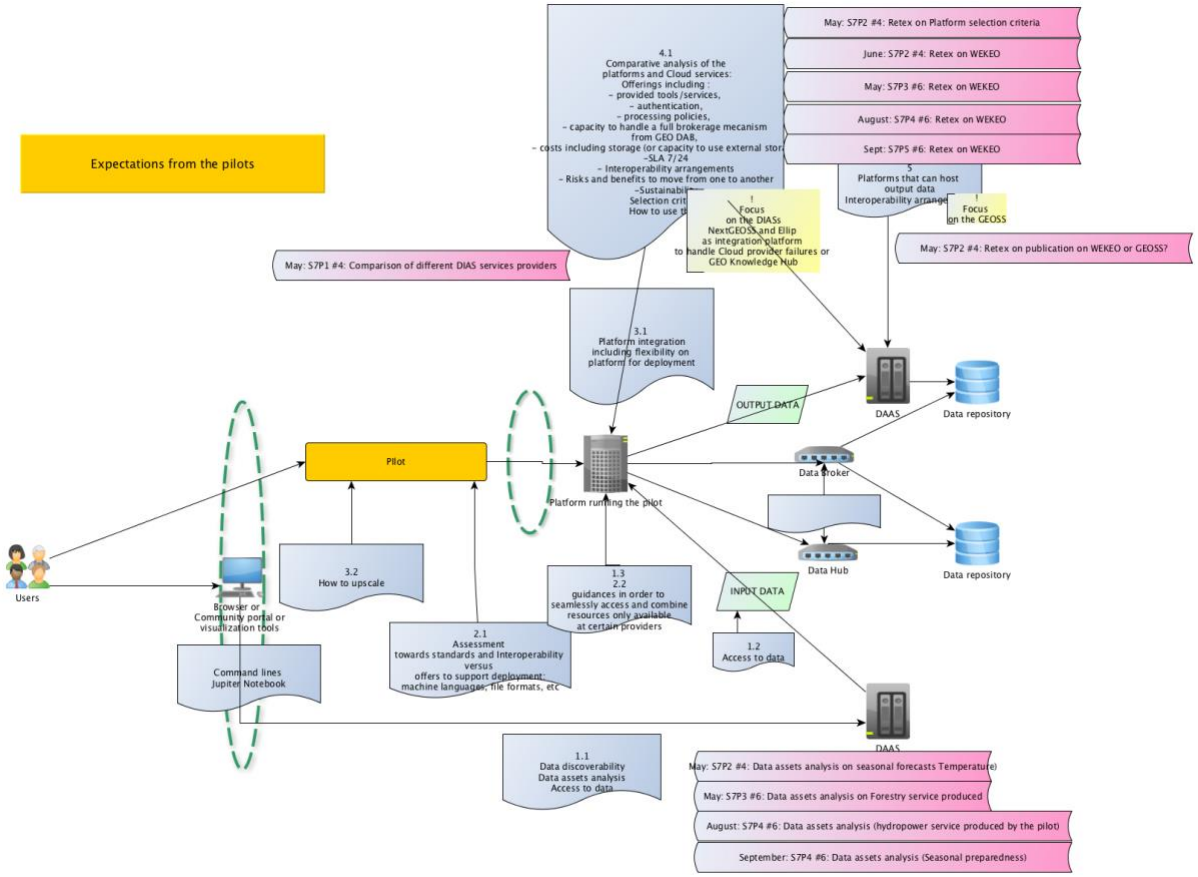

Figure 11: Climate Showcase. Focus of the pilots and expectations of WP3 from the pilots mapped into the conceptual workflow. The blue documents list the issues on which the pilots have expressed expectations of support from WP3. The pink containers identify focus of work of the pilots and the expectations of return of experience from WP3.