



IACS data sharing Achievements

Administrative Arrangement

JRC support

JRC (T1, D3 and D5) Team

27 April 2023

JRC Team for IACS65

T1: J. Escriu (WP1 leader), A. Kotsev, M. Minghini, E. Epure

D3: P. Wojda (project coordinator), S. Scarpa, J. Martín Jiménez, D. De Medici, F. Matthews, D. Vieira, D. De Rosa, C. Schillaci, P. Panagos, A. Jones, L. Montanarella, M. Van Liedekerke

D5: K. Tóth (WP2 leader); P. Milenov, R., G. Baiamonte, R. Vinas Abad (D.1 - contribution)

We have been working together on:

- **Discoverability** of IACS data and **accessibility**
- **Interoperability** of data sets and services through pilot projects (LULUCF, crop types/yield, statistics, CAP indicators)
- **Demonstration** through practical examples focusing on **soil health**
- **Exploration** and planning on how to use IACS potential, integrating and further analyzing available IACS data
- **Collaboration** with the Member States and other institutional stakeholders

IACS65 Timeline

- We started in **October 2020**
- Ended of April 2023
- **We have substantially:**
 - Improved IACS data discoverability and interoperability
 - Run pilots and soil health related use cases
 - Collaborated with Member States

WP1 Discoverability and Accessibility

WP 1. Objectives

- Let stakeholders **easily find, access and re-use** IACS data through **INSPIRE**
- Demonstrate the added value of the integration of IACS data within an **EU Common Agricultural Data Space**
- Support sharing of IACS data from Paying agencies through standard-based **APIs** (Application Programming Interface) endorsed by INSPIRE

NOTE: WP1 is executed through an AA between ENV.01 and JRC.T1 (AA 35863 EDEN-INSPIRE - Towards a European Data Ecosystem for Environment and sustainability)

IACS Data discoverability through the INSPIRE Geoportal

- Achieved by using interoperable metadata from MS and EFTA countries based on
 - **Technical Guidelines on IACS Spatial Data Sharing, Part 1 – Data discovery**
- Interoperable IACS metadata shall be classified using appropriate keywords.
 - IACS data metadata code list available in the INSPIRE Registry

<https://op.europa.eu/en/publication-detail/-/publication/f09b0355-f7c5-11ea-991b-01aa75ed71a1/language-en>

<https://inspire.ec.europa.eu/metadata-codelist/IACSData>

The screenshot shows the INSPIRE registry interface for IACS data. It includes the European Commission logo, language selection (English), and a breadcrumb trail: European Commission > INSPIRE > INSPIRE registry > INSPIRE metadata code list register > IACS data. The main heading is 'INSPIRE registry' and the specific entry is 'IACS data'. The entry details include: URI (http://inspire.ec.europa.eu/metadata-codelist/IACSData), This version (http://inspire.ec.europa.eu/metadata-codelist/IACSData:3), Version history (http://inspire.ec.europa.eu/metadata-codelist/IACSData:2 and http://inspire.ec.europa.eu/metadata-codelist/IACSData:1), Label (IACS data), Definition (Spatial data inserted in the systems and subsystems as defined in Art. 68 of Regulation (EU) 1306/2013), Description (The Integrated Administration and Control System (IACS) consists of computerised databases subsystems. The Identification System for Agricultural Parcels (better known as LPIS - Land Parcel Identification System) and the Aid Applications and Payments Claims subsystems of IACS contain the spatial data components.), Governance level (Good Practice (EU)), Reference Source (Regulation (EU) 1306/2013), Reference Link (http://data.europa.eu/eli/reg/2013/1306/oj), Status (Valid), and Insert date (2021-03-22 17:19 PM CET). Available formats include XML Registry, XML ISO 19135, RDF/XML, JSON, CSV, ATOM, and ROR. Below the details is an 'Available items' section with a table showing 6 entries.

Label	Governance level	Status
Agricultural area	Good Practice (EU)	Valid
Ecological Focus Area	Good Practice (EU)	Valid
GSA	Good Practice (EU)	Valid
IACS	Good Practice (EU)	Valid
LPIS	Good Practice (EU)	Valid
Reference Parcel	Good Practice (EU)	Valid

The image shows the cover of a JRC Technical Report. At the top is the European Commission logo. Below it, the text reads 'JRC TECHNICAL REPORT' and 'Technical Guidelines on IACS Spatial Data Sharing Part 1 – Data discovery'. The authors are listed as 'Tóth, Katalin; Milanov, Pavol'. At the bottom right, the report number 'EUR 30330 EN' is visible. A diagram on the right side of the cover illustrates the data flow and components of the IACS system, including 'Metadata values', 'Metadata schema', and 'Spatial data publication'.

IACS Metadata tests in the INSPIRE Reference Validator

- **Purpose:**
 - Providing IACS data providers and CAP Paying Agencies with a common tool for assessing the conformity of metadata for their agricultural data.
 - In terms of generic INSPIRE metadata and IACS-specific requirements stated in the Technical Guidelines on IACS Spatial Data Sharing, Part 1 – Data discovery.

- **Access:**

<https://inspire.ec.europa.eu/validator/test-selection/index.html>

Configure your test > Advanced Options > Conformance Class 2C: “INSPIRE data sets and data set series metadata for IACS”.

European Commission | English | Search

European Commission > INSPIRE > Validator > Test selection

INSPIRE Reference Validator - Test selection

Home | Test selection | Test reports | Get support | More on the INSPIRE Reference Validator

Configure your test

Select the INSPIRE resource you would like to test

- Metadata
- View Service
- Download Service
- Discovery Service
- Data set

Select the Technical Guidelines version

- Version 1.3 - DEPRECATED
- Version 2.0

Select the type of metadata record(s) to be tested

- Data sets and data set series
- Network Service
- Spatial Data Service

Advanced options ^

Select the conformance classes to be assessed

- Common Requirements for ISO/TC 19139:2007 based INSPIRE metadata records ([source](#))
- Conformance Class 1: 'Baseline metadata for data sets and data set series' ([source](#))
- Conformance Class 2: 'INSPIRE data sets and data set series interoperability metadata' ([source](#))
- Conformance Class 2b: 'INSPIRE data sets and data set series metadata for Monitoring' ([source](#))
- Conformance Class 2c: 'INSPIRE data sets and data set series metadata for IACS' ([source](#))

Antispam:
Using the slider, select which of the following numbers is lowest: 33 or 29.

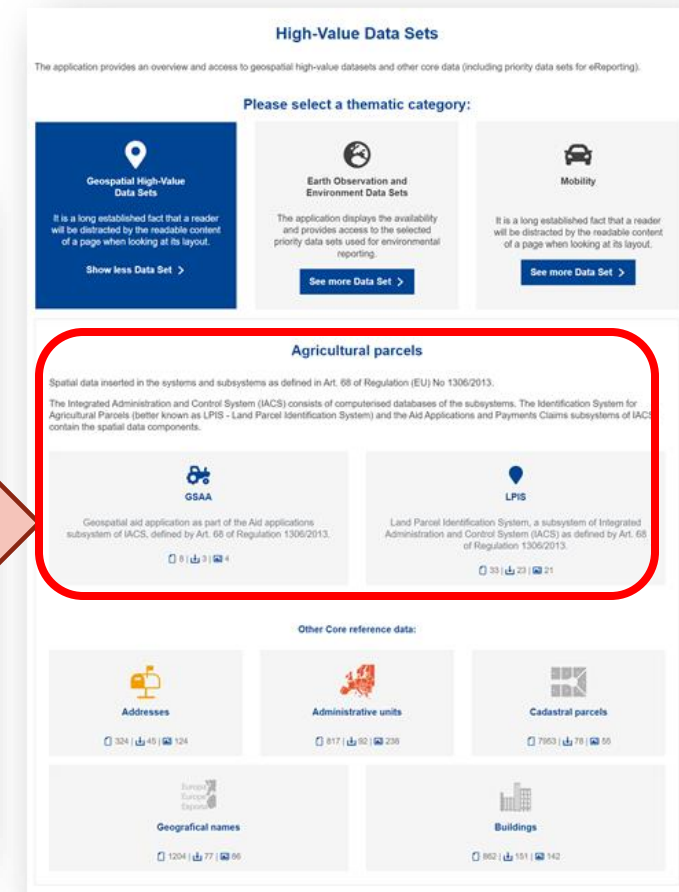
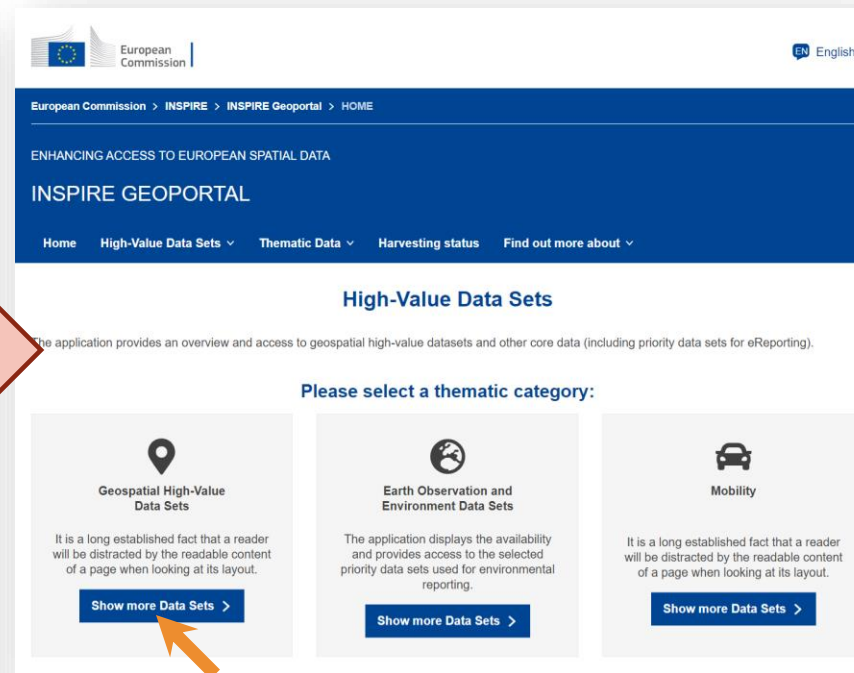
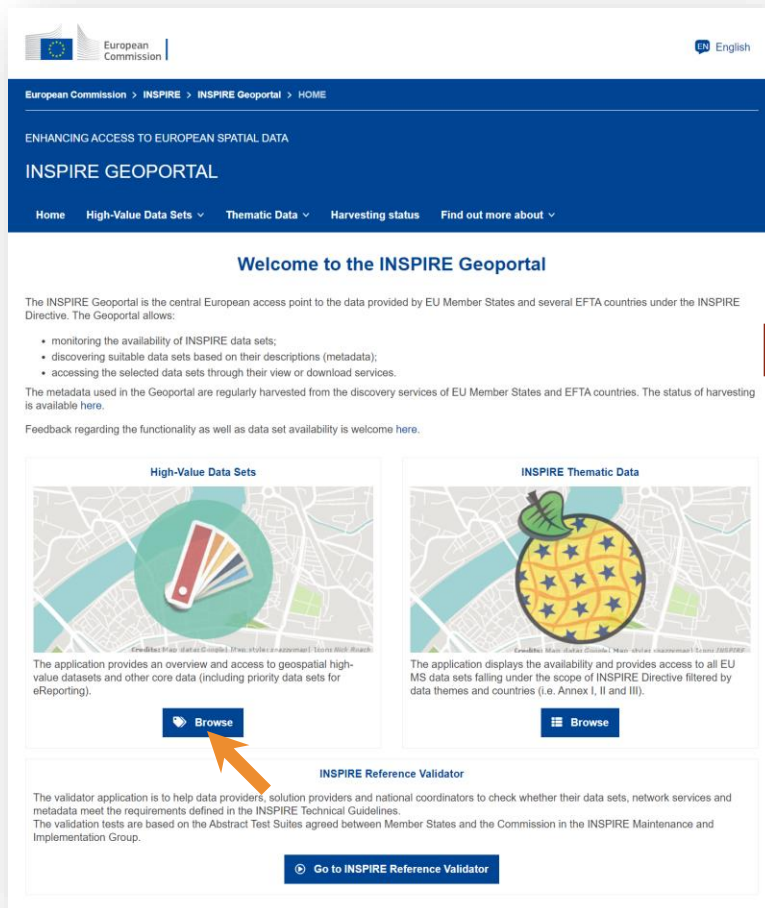
Your selected answer is: 29

Verify

Start test >

INSPIRE Geoportal & HVDs

- Revamped INSPIRE Geoportal user interface



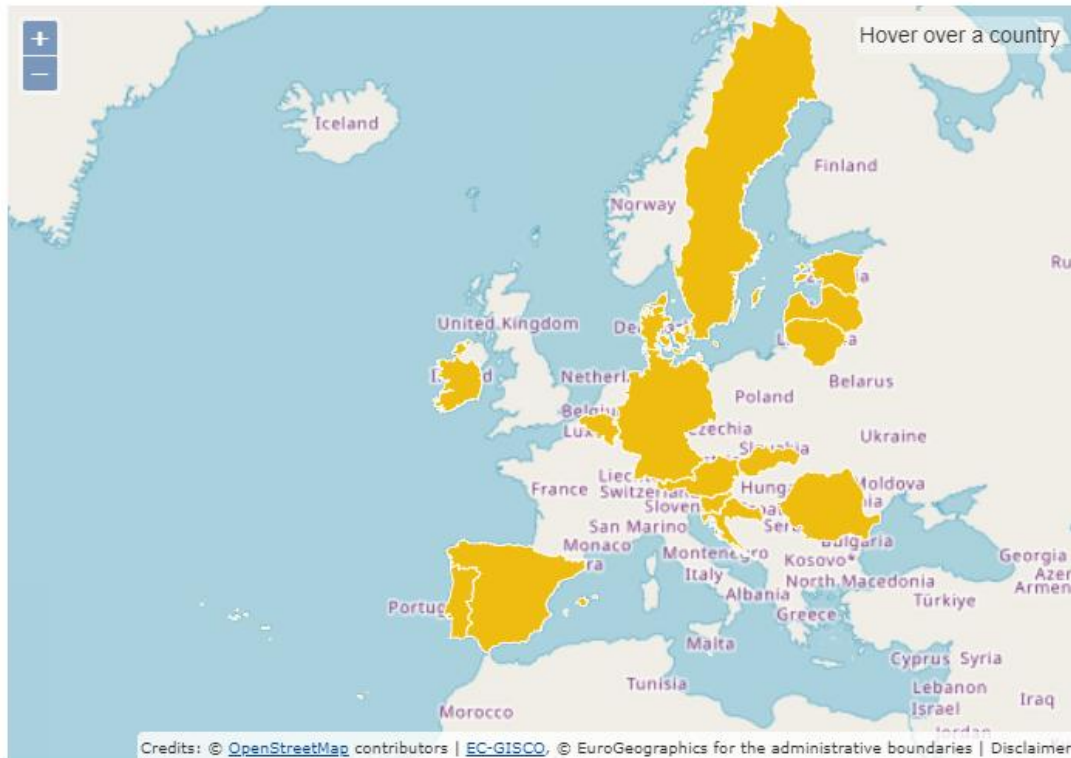
- Allows browsing data based on HVDs, including Agricultural Data.
- According the Implementing Act on HVDs.
- **To be launched soon!**

INSPIRE geoportal: High-Value Datasets– (LPIS)

INSPIRE Data Sets - EU & EFTA Country overview

25-04-2023

Data sets by **IACS: LPIS**



INSPIRE Geoportal Dataset Statistics

67
Metadata records

54
Downloadable Data Sets

56
Viewable Data Sets

Spatial scope coverage:

- National
- Regional

16 MS
sharing
already
datasets
(LPIS)

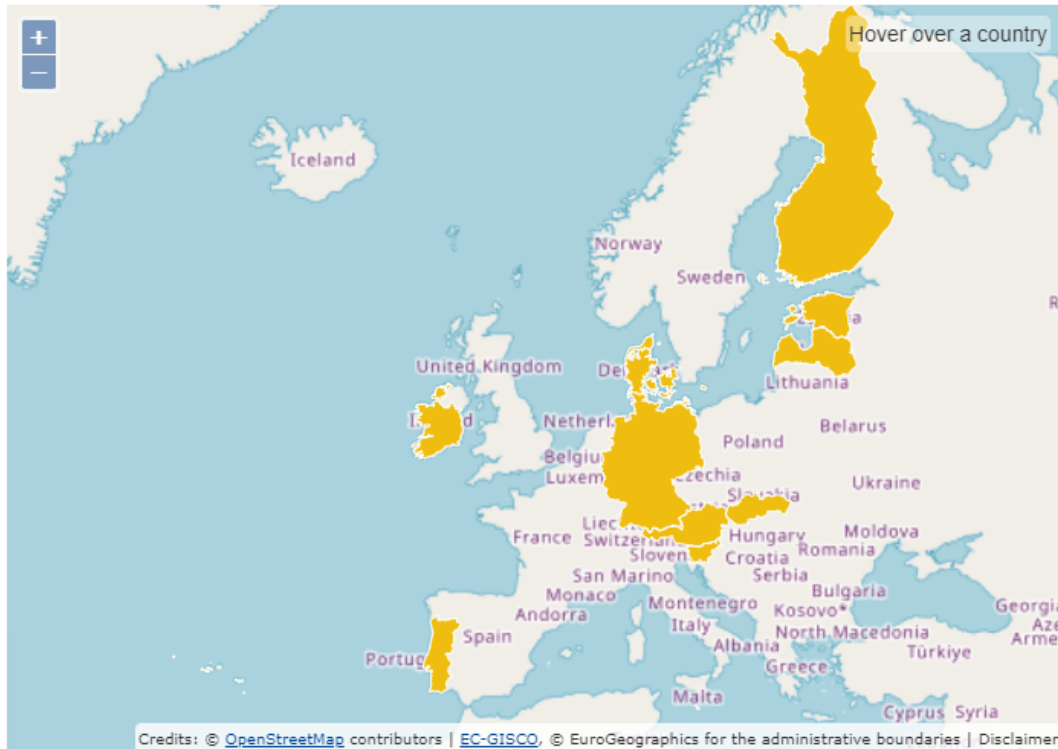
- INSPIRE implementation for IACS: positive trend ↑
- Commission will continue to provide support (TG, pilot use cases, training, visit to PA...)

INSPIRE geoportal: High-Value Datasets– (GSAA)

INSPIRE Data Sets - EU & EFTA Country overview

Data sets by **IACS: GSAA**

25-04-2023



INSPIRE Geoportal Dataset Statistics

51
Metadata records

43
Downloadable Data Sets

42
Viewable Data Sets

11 MS
sharing
already
datasets
(GSAA)

Spatial scope coverage:

National

Regional

WP 1. Conclusions

- **INSPIRE has proven to be effective** in the discovery and sharing of interoperable IACS Data.
- Tools are available for improving the situation (TG, IACS Metadata tests, metadata examples from countries with are ahead on implementation).
- TG is usable (48.4% of [EUR27 + CH, IS, LI, NO] with LPIS or GSAA data).
- However, European coverage has to be improved (48.4% → 100%).
- Appropriate actions need to be taken to improve the situation:
 - Continue promoting engagement of MSs (INSPIRE NCPs, PAs and DG-AGRI).
 - Organise ad-hoc training activities (e.g. this Workshop).
- Shaping the new EU Agricultural Data Space: recommendations, use of APIs (OGC SensorThings-API and OGC API-Features).

WP2 - Interoperability

Two pillars of data sharing

Data sharing: easy access and reuse of data

D
i
s
c
o
v
e
r
y

I
n
t
e
r
-
o
p
e
r
a
b
i
l
i
t
y

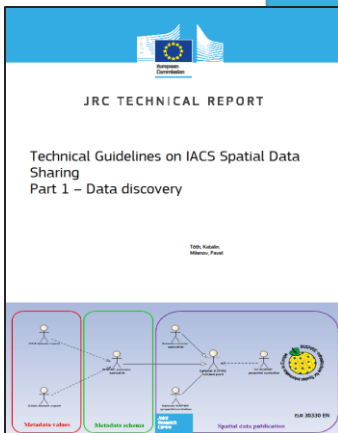
Revision in progress

Discoverability

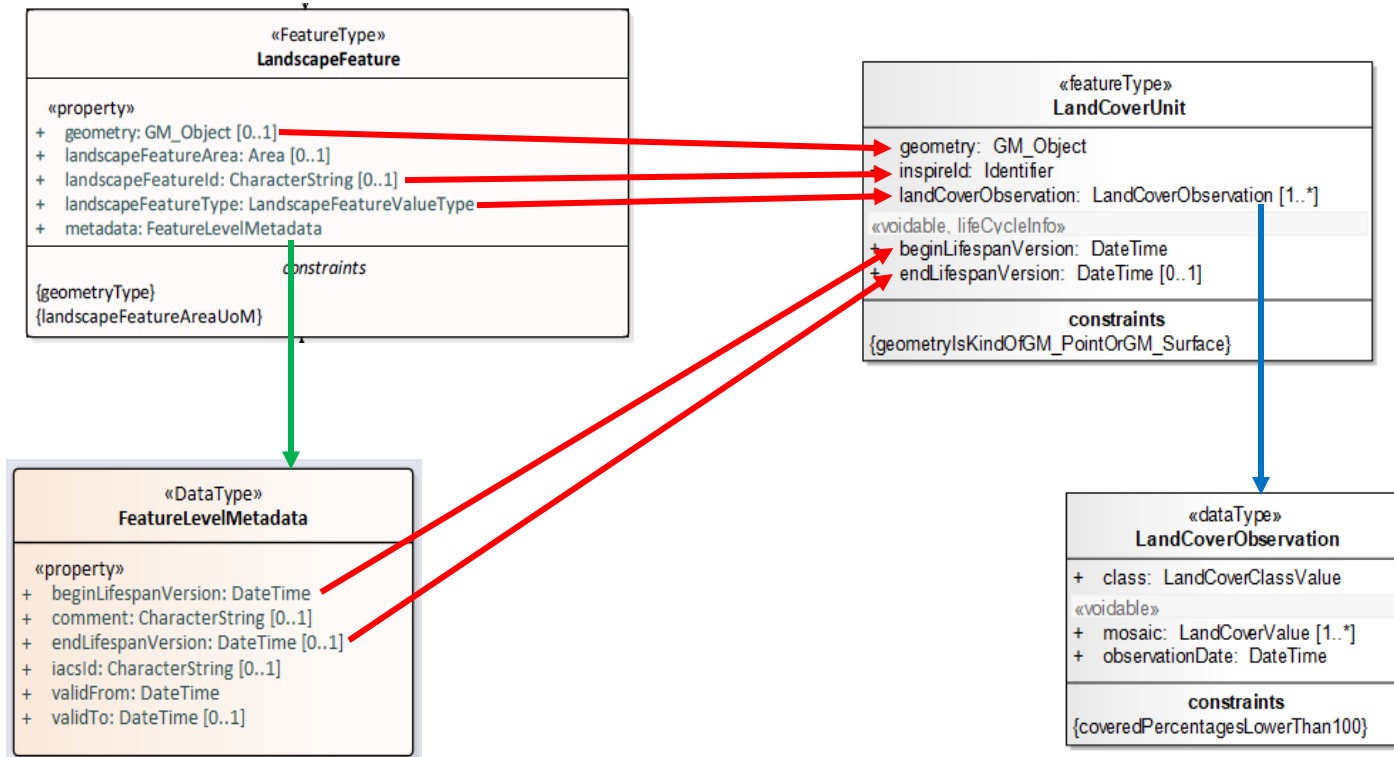
- Agreed and well-known keywords
- Through access hubs

Interoperability

- Data publishing: according to agreed standards
- Without repetitive interventions of users



Mapping between IACS and INSPIRE



- From the elements of the harmonised LPIS and GSAA application schema to the elements INSPIRE Land cover and Land Use themes
- Currently provided as Annex of the interoperability TG

Technical Guideline 2 - Data interoperability



JRC TECHNICAL REPORT

I

Technical Guidelines on IACS Spatial Data Sharing
Part 2 – LPIS and GSAA data interoperability

Martino, G., Toth, K.

2022



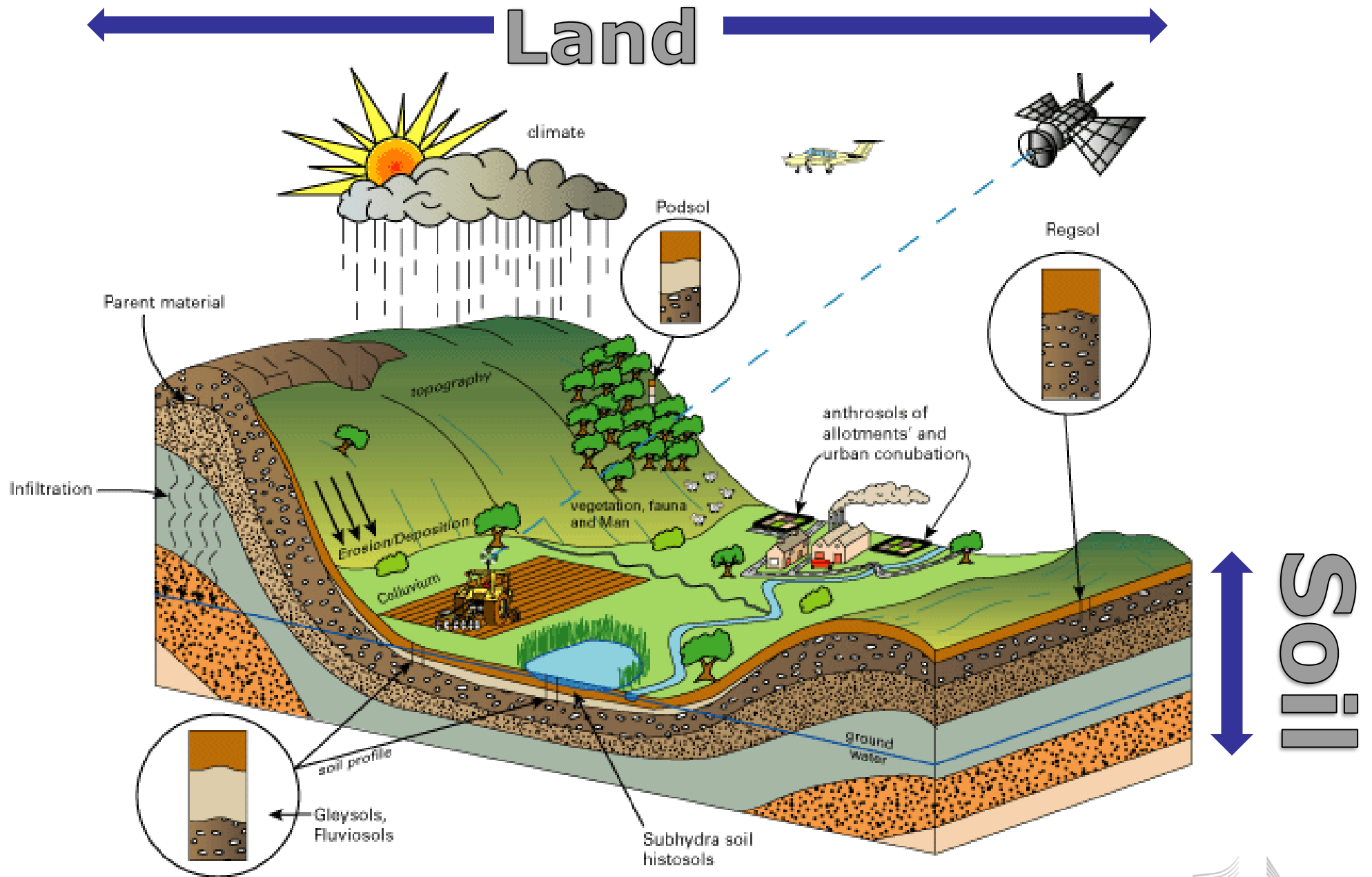
The document will be presented to and revised by the **agricultural community** (Paying agencies) and the INSPIRE community

The draft document will be distributed in two channels: Data sharing expert group of the PAs, INSPIRE MIG-T (28 April 2023)

The comments should be included in the '**comments template**'
The comments should be provided by 28 May at the latest

Results from the Commission in the course of June 2023

WP3 Use-cases & modelling



Workpackage 3

IACS: LPIS & GSAA

- Spatial location of agricultural features
- Practices



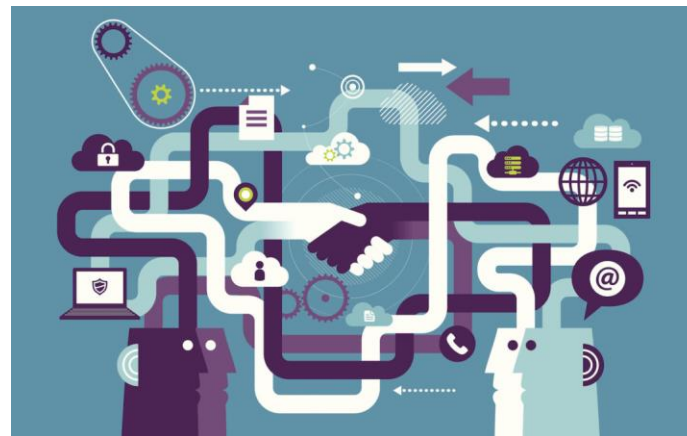
- Sewing/harvest date
- Cover (residue management, tillage)



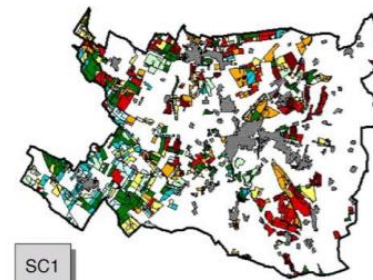
- Soil properties



Soil health models



- Metadata
- Discoverability
- Accessibility
- Interoperability
- EU Common Data Space



Conclusions – Policy oriented

- IACS+ is a tool to **guide local to regional** level management practices, pesticides applications rates, intensive/extensive practices, degradation
- **Policy evaluation** – e.g. Good Agricultural and Environmental Conditions (GAEC)
- **Scenario analysis**: How can minimum soil cover maintenance (GAEC 4) reduce erosion?
- Current policies in the reduction of environmental **impacts** (e.g. reduction of use of pesticides in 50%);

Conclusions - Scientific

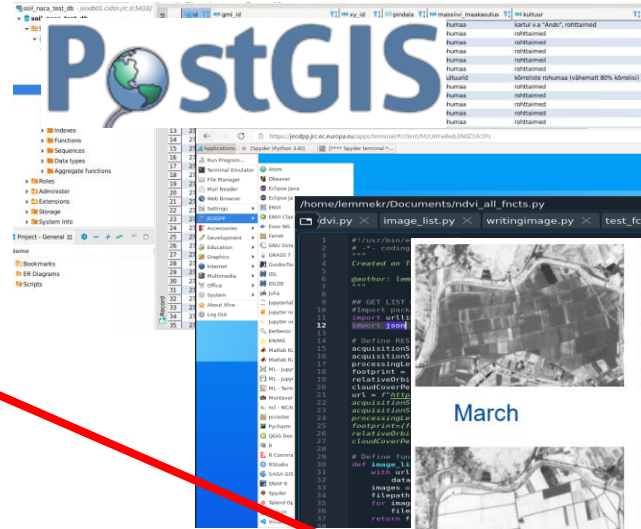
- IACS data in an object-oriented approach can become **a new convention in soil health modelling**: erosion, pesticides, SOC, land degradation and more
- IACS is an informatic framework to add **more properties and methods** relevant for soil health assessment
- IACS provides spatio-temporal framework with **“ground-truth”**
- IACS is useful at both the **field parcel scale and regional to continental scale**

WP4 IACS exploration & integration

Big Data Analysis

Using JeoDPP for VI time-series on parcel level

Script process



Query to select scope of analysis. Maize & Grasslands different regions. 50 random parcels across Countries

Parameter selection. Year 2020, less than 10% cloud cover and resample 1 month



Copernicus data: Sentinel 2 images

Running script

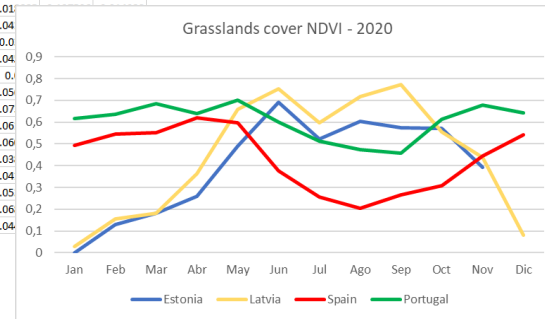
```

41 # CALCULATE NDVI FOR EACH IMAGE IN LIST
42 # Import packages
43 import rasterio
44 import numpy as np
45 import glob
46 import os
47
48 # Define function
49 def calc_ndvi(filepath):
50     # filepath = filepath
51     images = rasterio.ListReader(filepath)
52     imagesPath = f"{filepath}/GRANULE/"
53     images = glob.glob(imagesPath + "*/MS*/**/*.tif")
54     images = glob.glob(imagesPath + "*/MS*/**/*.tif")
55     images = rasterio.open(imagesPath)
56     images = rasterio.open(imagesPath)
57     images = rasterio.open(imagesPath)
58     images = rasterio.open(imagesPath)
59     images = rasterio.open(imagesPath)
60     images = rasterio.open(imagesPath)
61     images = rasterio.open(imagesPath)
62     images = rasterio.open(imagesPath)
63     images = rasterio.open(imagesPath)
64     images = rasterio.open(imagesPath)
65     images = rasterio.open(imagesPath)
66     images = rasterio.open(imagesPath)
67     images = rasterio.open(imagesPath)
68     images = rasterio.open(imagesPath)
69     images = rasterio.open(imagesPath)
70     images = rasterio.open(imagesPath)
71     images = rasterio.open(imagesPath)
72     images = rasterio.open(imagesPath)
73     images = rasterio.open(imagesPath)
74     images = rasterio.open(imagesPath)
75     images = rasterio.open(imagesPath)
76     images = rasterio.open(imagesPath)
77     images = rasterio.open(imagesPath)
78     images = rasterio.open(imagesPath)
79     images = rasterio.open(imagesPath)
80     images = rasterio.open(imagesPath)
81     images = rasterio.open(imagesPath)
82     images = rasterio.open(imagesPath)
83     images = rasterio.open(imagesPath)
84     images = rasterio.open(imagesPath)
85     images = rasterio.open(imagesPath)
86     images = rasterio.open(imagesPath)
87     images = rasterio.open(imagesPath)
88     images = rasterio.open(imagesPath)
89     images = rasterio.open(imagesPath)
90     images = rasterio.open(imagesPath)
91     images = rasterio.open(imagesPath)
92     images = rasterio.open(imagesPath)
93     images = rasterio.open(imagesPath)
94     images = rasterio.open(imagesPath)
95     images = rasterio.open(imagesPath)
96     images = rasterio.open(imagesPath)
97     images = rasterio.open(imagesPath)
98     images = rasterio.open(imagesPath)
99     images = rasterio.open(imagesPath)
100    images = rasterio.open(imagesPath)

```

Results

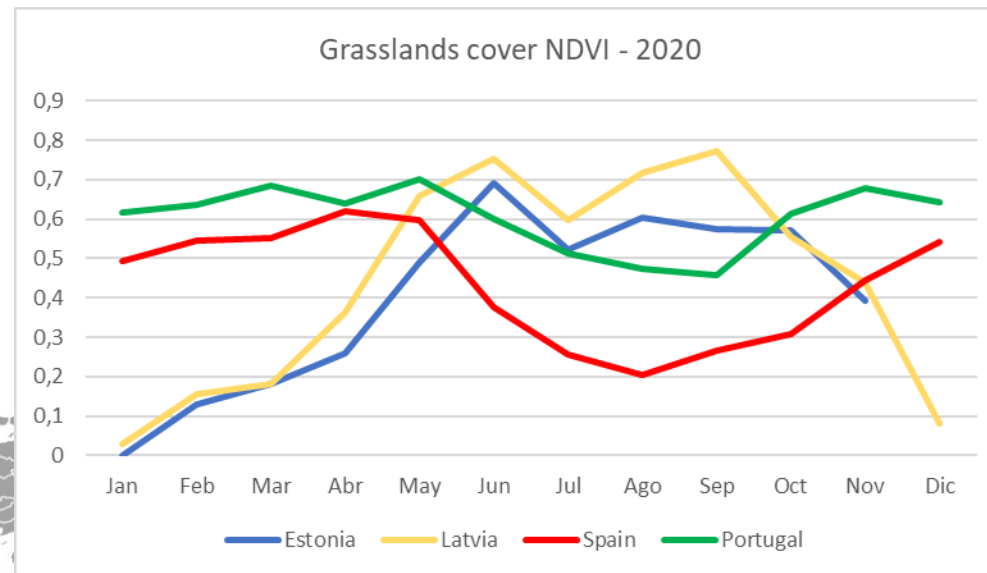
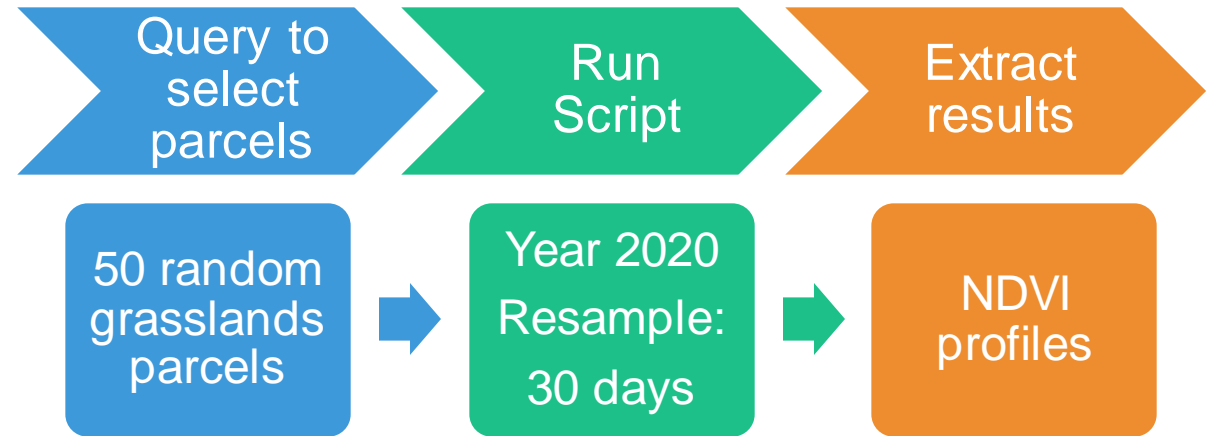
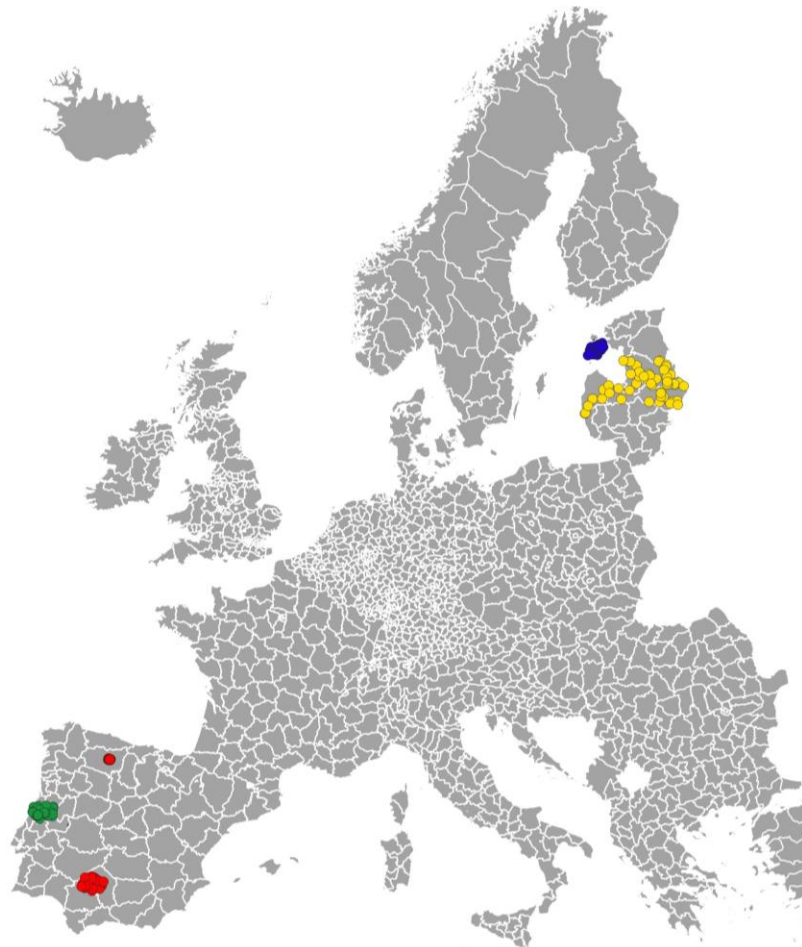
NDVI	_mean	_median	_stdev	_min	_max
28/03/2020	0.194639	0.193808	0.01338	0.154525	0.262956
04/04/2020	0.221991	0.219917	0.014996	0.184893	0.301874
07/04/2020	0.177874	0.176955	0.013823	0.13945	0.256903
22/04/2020	0.177754	0.175369	0.013823	0.13945	0.256903
22/05/2020	0.189311	0.181083	0.013823	0.13945	0.256903
27/05/2020	0.229593	0.221311	0.013823	0.13945	0.256903
03/06/2020	0.327536	0.320585	0.04	0.13945	0.256903
13/06/2020	0.6408	0.653378	0.01	0.13945	0.256903
21/06/2020	0.816679	0.833618	0.05	0.13945	0.256903
23/06/2020	0.8038	0.829457	0.07	0.13945	0.256903
28/06/2020	0.754875	0.77086	0.06	0.13945	0.256903
18/07/2020	0.793261	0.808363	0.06	0.13945	0.256903
10/08/2020	0.586166	0.585477	0.03	0.13945	0.256903
17/08/2020	0.506415	0.503053	0.04	0.13945	0.256903
19/09/2020	0.493907	0.493301	0.05	0.13945	0.256903
08/11/2020	0.218353	0.201459	0.06	0.13945	0.256903
08/12/2020	0.116314	0.108354	0.04	0.13945	0.256903



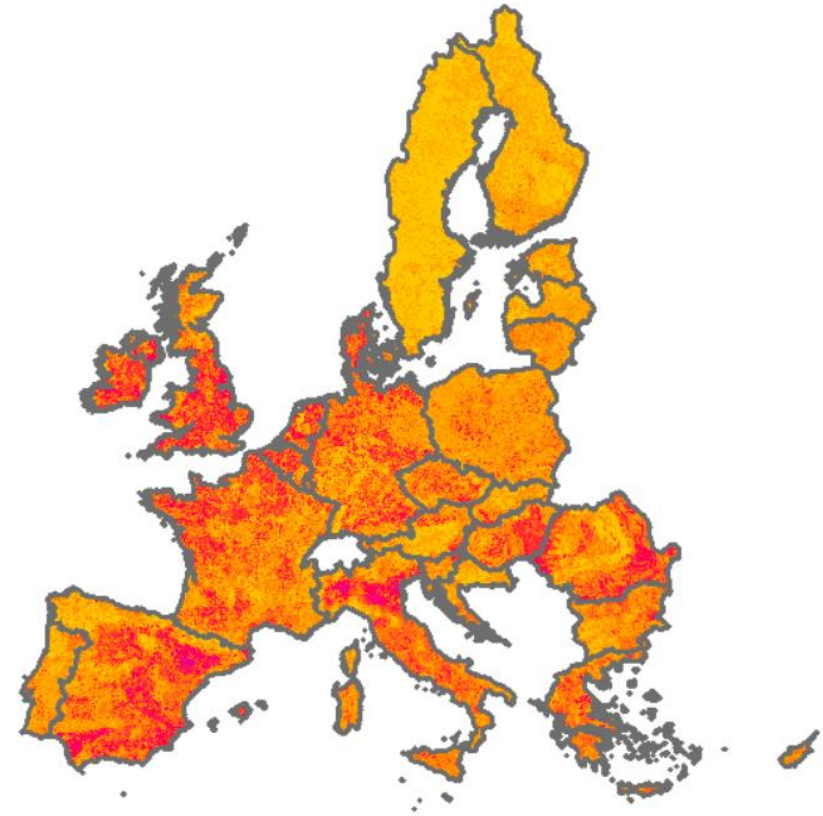
Processing Chain

Vegetation index script examples

LPIS Grasslands



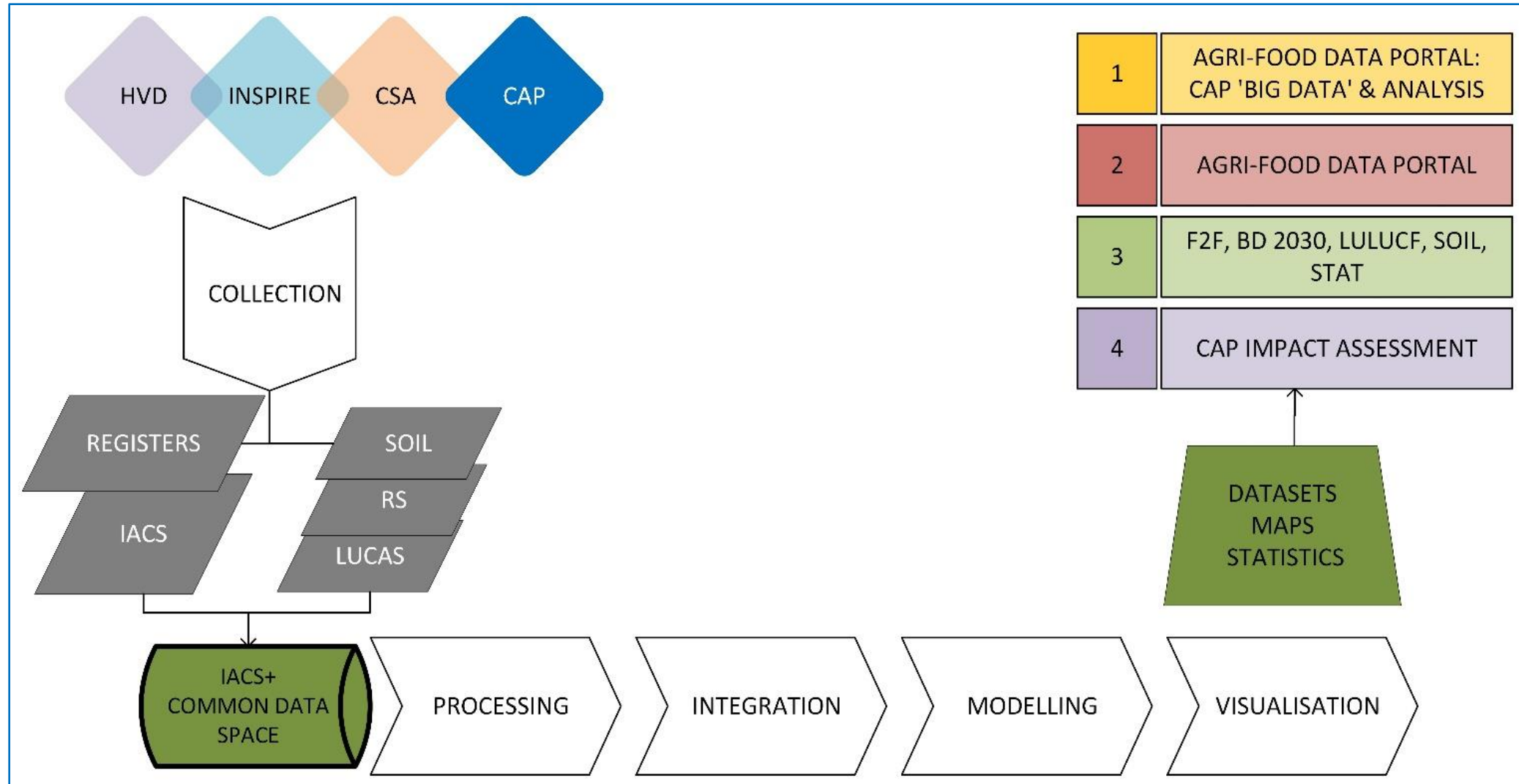
Parcels data and Soil Health Indicators



SAIS

Spatial Agricultural Information System

Policy context: performance and data needs

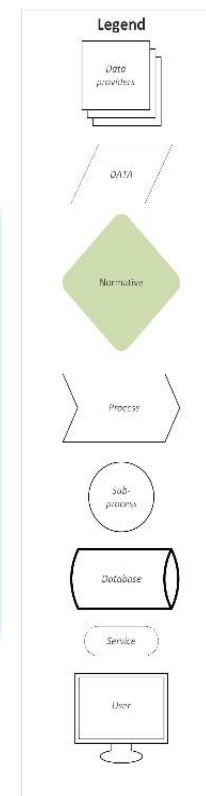
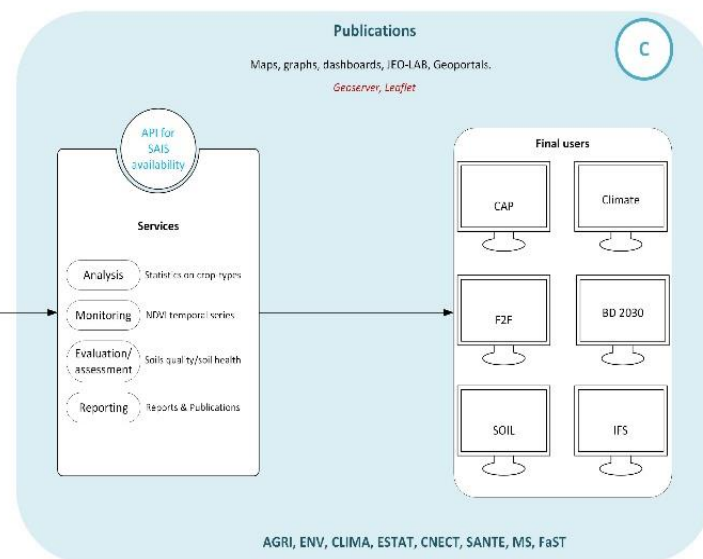
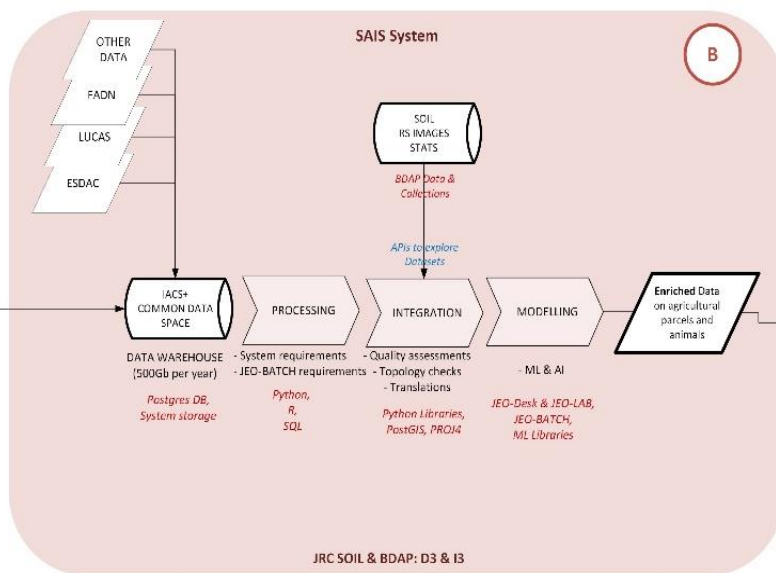
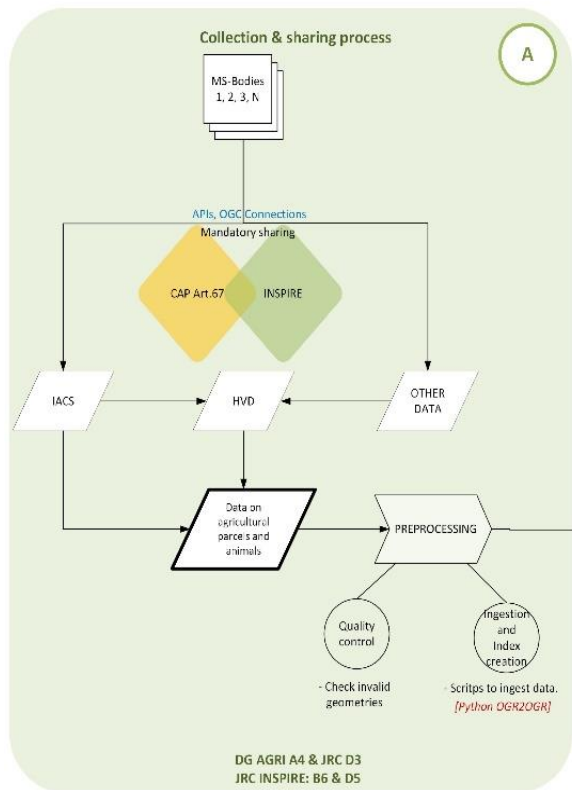


Policy context: performance and data needs

- Agriculture: important for the CAP and outside (GD)
- In addition to compliance, performance is key
- From IAS framework (process established) to ECA recommendation (improve analysis capacity, big data, disaggregated data)
- Need to continue IACS 65 activities & enlarge to other public bodies (as data owner)

SAIS: a Spatial Agricultural Information System

Project Leaders: DG AGRI A4 & JRC D3



WP1: data collection/processing

WP2: data integration/interoperability

WP3: data publication

Keep in touch



EU Science Hub: ec.europa.eu/jrc



@EU_ScienceHub



EU Science Hub – Joint Research Centre



EU Science, Research and Innovation



Eu Science Hub

Thank you



© European Union 2020

Unless otherwise noted the reuse of this presentation is authorised under the [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/) license. For any use or reproduction of elements that are not owned by the EU, permission may need to be sought directly from the respective right holders.