

CALLISTO

BRIDGING THE GAP
BETWEEN COPERNICUS DATA
PROVIDERS AND END USERS THROUGH
ARTIFICIAL INTELLIGENCE SOLUTIONS

PILOT USE CASES BROCHURE



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PILOT USE CASES

SATELLITE JOURNALISM

- Germany
- Poland

PRESS

LAND BORDER CHANGE DETECTION

- European borders
- Spain-Morocco | Croatia-Bosnia and Herzegovina
- Greece-North Macedonia | Hungary-Serbia



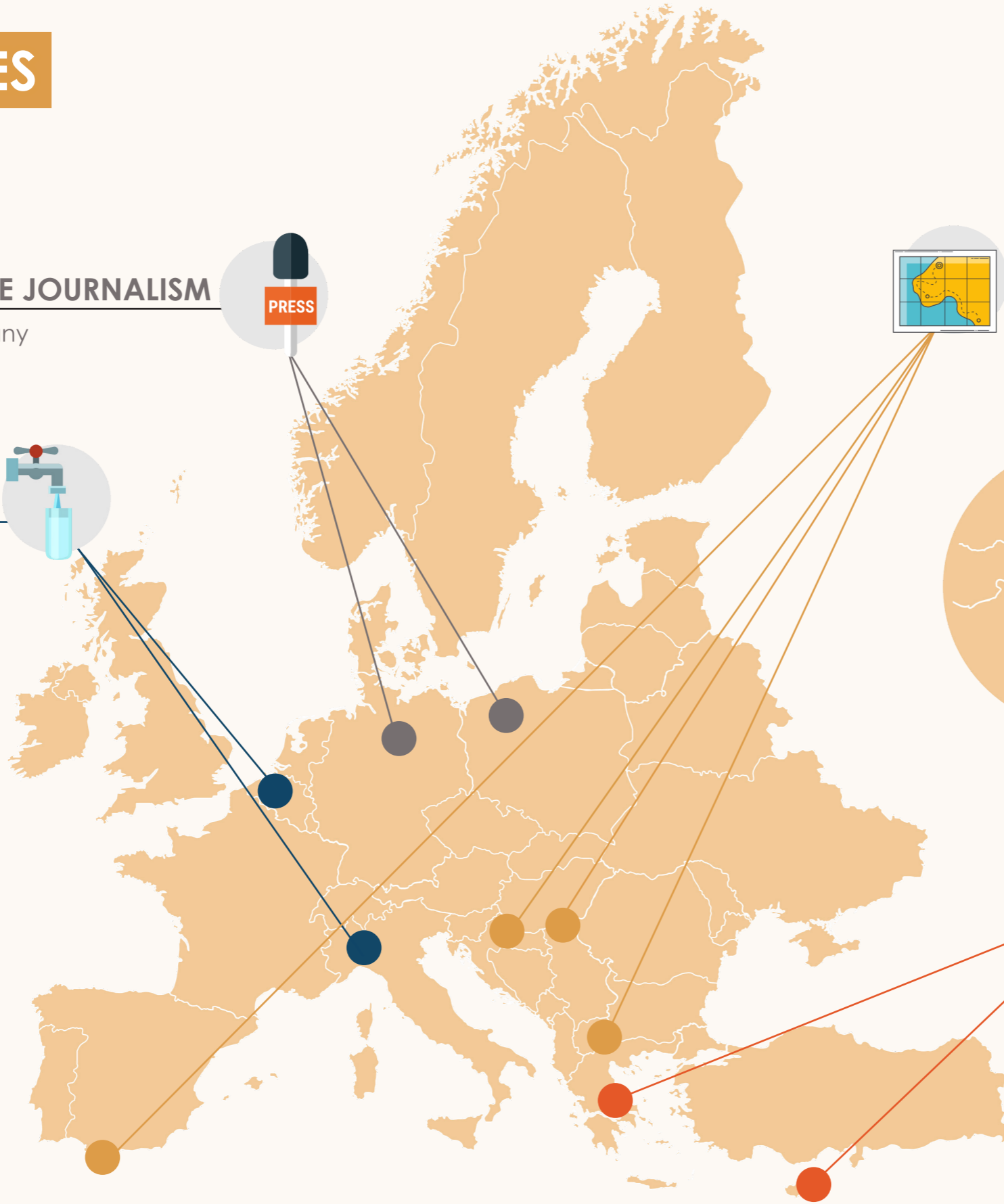
CAP MONITORING

- Greece
- Cyprus



WATER QUALITY ASSESSMENT

- Belgium
- Italy



PUC1 - CAP MONITORING

PUC1 locations
Cyprus
Orchomenos, Greece

Technological assets used
Sentinel 1 & 2 Imagery, UAV,
Mobile Phone Cameras, Action
Cameras, VIS/NIR/SWIR Cameras

End users
Agriculture Policymakers
Insurance Companies

Partners responsible
NOA, ACCELIGENCE
CERTH, DRAXIS

CHALLENGE

CAP monitoring is based on On-The-Spot Checks (OTSC) and/or interpretation of high-resolution field images. The implementation of an automated monitoring system could enhance the regularity and scalability of checks, and empower decision-making for appropriate follow-up actions.

MAIN GOAL

PUC1 aims to establish an automated system using advanced satellite data and data from other sources to monitor activities such as crop type identification for crop diversification and tree counting, eliminating the need for OTSC and accelerating payment management and control measures.

EXPECTED IMPACT

PUC1 will exploit a variety of data collections in a semi-automatic way to support the reusability of Deep Learning algorithms in CAP monitoring. The collections of these data and their analysis will support EU implementation bodies and policymakers in EU CAP monitoring.

INNOVATIVE SOLUTIONS

A mobile application for farmers & inspectors

A crop classification model generating a traffic light-based map

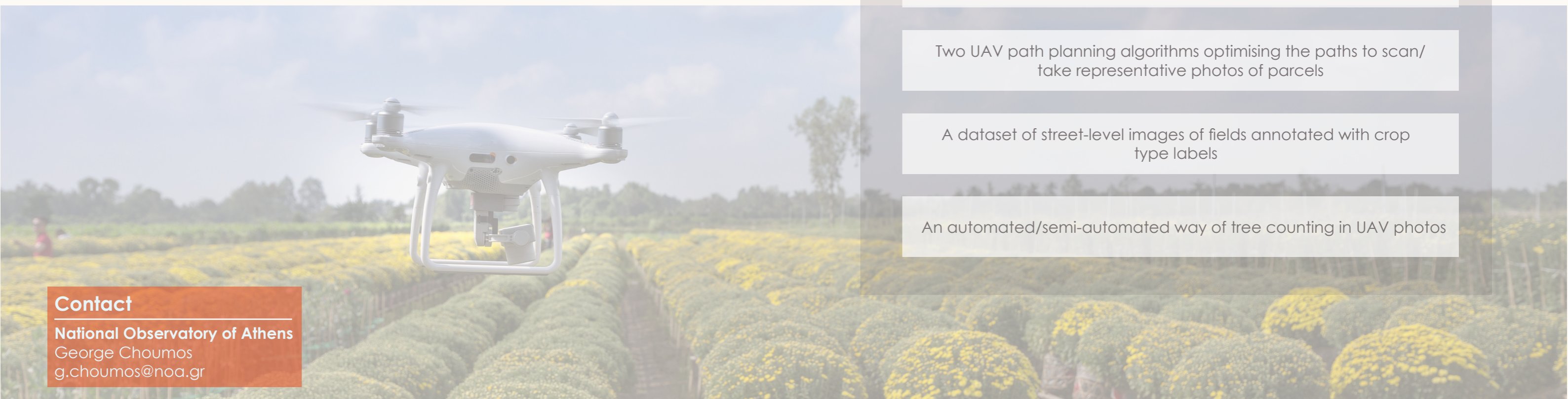
A dataset of UAV images collected from field campaigns

A fully automated pipeline, in which the UAV sends near real-time images to the CALLISTO mobile app

Two UAV path planning algorithms optimising the paths to scan/ take representative photos of parcels

A dataset of street-level images of fields annotated with crop type labels

An automated/semi-automated way of tree counting in UAV photos



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PUC2 - WATER QUALITY ASSESSMENT



PUC2 locations
De Blankaart, Belgium
La Loggia, Italy



Technological assets used
Hyperspectral Camera, Sentinel-2
& Landsat-8 Imagery, Water Quality
Sensors & Analysis



End users
Water Utilities
Environmental Agencies



Partners responsible
De Watergroep, SMAT,
RBINS

CHALLENGE

Water scarcity and deterioration of raw water quality are an increasing concern for the future drinking water supply. Eutrophication and algae blooms in raw water storage basins significantly hamper drinking water production.

MAIN GOAL

PUC2 aims to develop a methodology to quantify water quality variables, such as chlorophyll A and turbidity, from remote sensing data. The outcome will be made available to end users in an online platform and through an augmented reality application.

EXPECTED IMPACT

PUC2 will exploit satellite data, in-situ hyperspectral data and water quality measurements to offer an improved and continuous water quality monitoring of surface waters, providing spatially complete information over water basins' surfaces.

INNOVATIVE SOLUTIONS

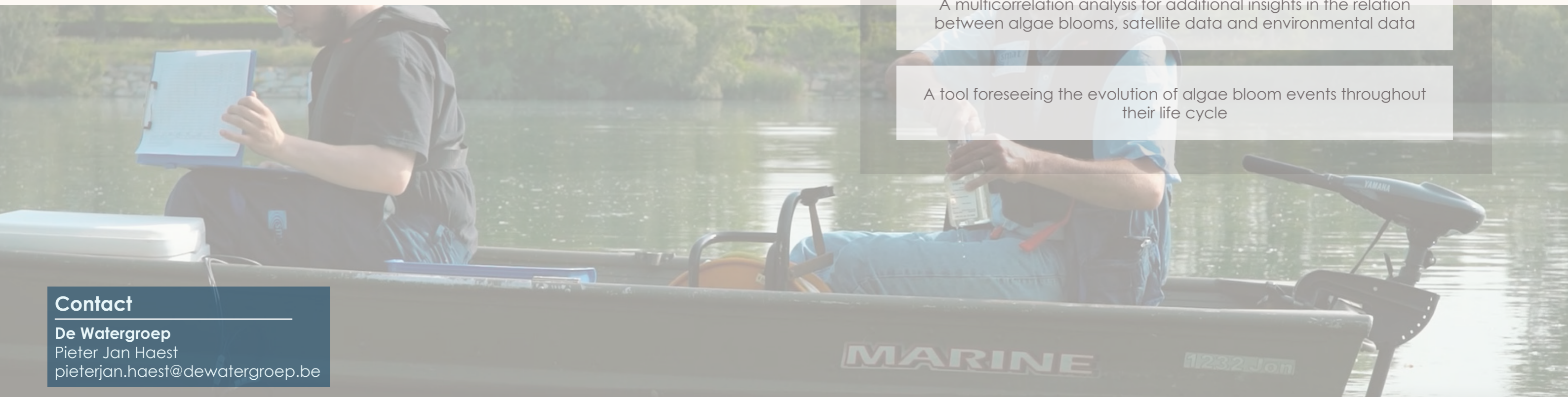
An automated data processing chain with near real-time validated and atmospheric corrected water reflectance products

An analysis ready dataset for the Blankaart and SMAT lagoons

A tool generating hyperspectral signals from multispectral ones

A multicorrelation analysis for additional insights in the relation between algae blooms, satellite data and environmental data

A tool foreseeing the evolution of algae bloom events throughout their life cycle





Contact


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PUC3 - SATELLITE JOURNALISM

 **PUC3 locations**
Germany
Poland

 **Technological assets used**
Sentinel 5p-data, Air Quality Sensors

 **End users**
Journalists

 **Partners responsible**
Deutsche Welle
DRAXIS

CHALLENGE

Air Quality (AQ) has been a topic in media coverage for a longer time. But in light of the climate crisis and the European Green Deal initiatives, the topic enjoys increasing attention. Also, data sources measuring AQ, such as satellite and sensor data, become more and more available. However, the data is not easily accessible and most importantly not easily understandable by non-experts such as journalists.

MAIN GOAL

PUC3 contributes to environmental journalism by providing a research tool that allows journalists to monitor and investigate AQ data from various sources. On top of this, it enables the journalist to interpret AQ data supported by AI.

EXPECTED IMPACT

PUC3 will provide easy access not only to AQ data but also to its contextualization. The data will be derived from various sources, such as official monitoring stations and satellites, and will be provided via an interface tailored for journalists, helping them build credible environmental stories.

INNOVATIVE SOLUTIONS

A tool continuously monitoring and visualising AQ data within user-defined areas of interest in Europe

An AQ prediction model producing 3-day forecasts

A dataset of historical AQ information for given areas of interest

AQ trends analysis over long periods of time

Contact

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PUC4 - LAND BORDER CHANGE DETECTION

-  **PUC4 locations**
European borders
-  **End users**
Image Analysts
Law Enforcement Agencies

-  **Technological assets used**
Satellite Imagery (Sentinel 2A - Multi-spectral), UAV (N-IR)
-  **Partners responsible**
European Union Satellite Centre (SatCen)

CHALLENGE

Changes in land borders impose corresponding changes in their permeability and consequently, the construction of preventive operational measures (e.g., fences, walls, etc.) may be needed in order to ensure border security.

MAIN GOAL

PUC4 aims to support the operational work of image analysts at SatCen working on border surveillance tasks. In particular, the CALLISTO platform will be able to process Sentinel data, perform accurate land change detection to infer relevant changes at borders and deliver notifications to the analysts.

EXPECTED IMPACT

PUC4 will provide a Sentinel-powered Land Border Observatory prototype, delivering notifications for further processing and analysis from imagery analysts, and improve aspects of detecting accurately relevant land changes at EU borders.

INNOVATIVE SOLUTIONS

Rasterised relevant change detection probability layers at EU external borders based on EO data

Relevant land change detection notifications delivered to the user as new "events" are detected

Generation and proposal of a flight plan for future UAV missions



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ENVIRONMENTAL TECHNOLOGIES



museum
NATURALS SCIENCES BE



GS
GROUP



smat
gruppo

