# **EORegions!**, a tool to support AI Implementation

EARTH OBSERVATION REGIONS !

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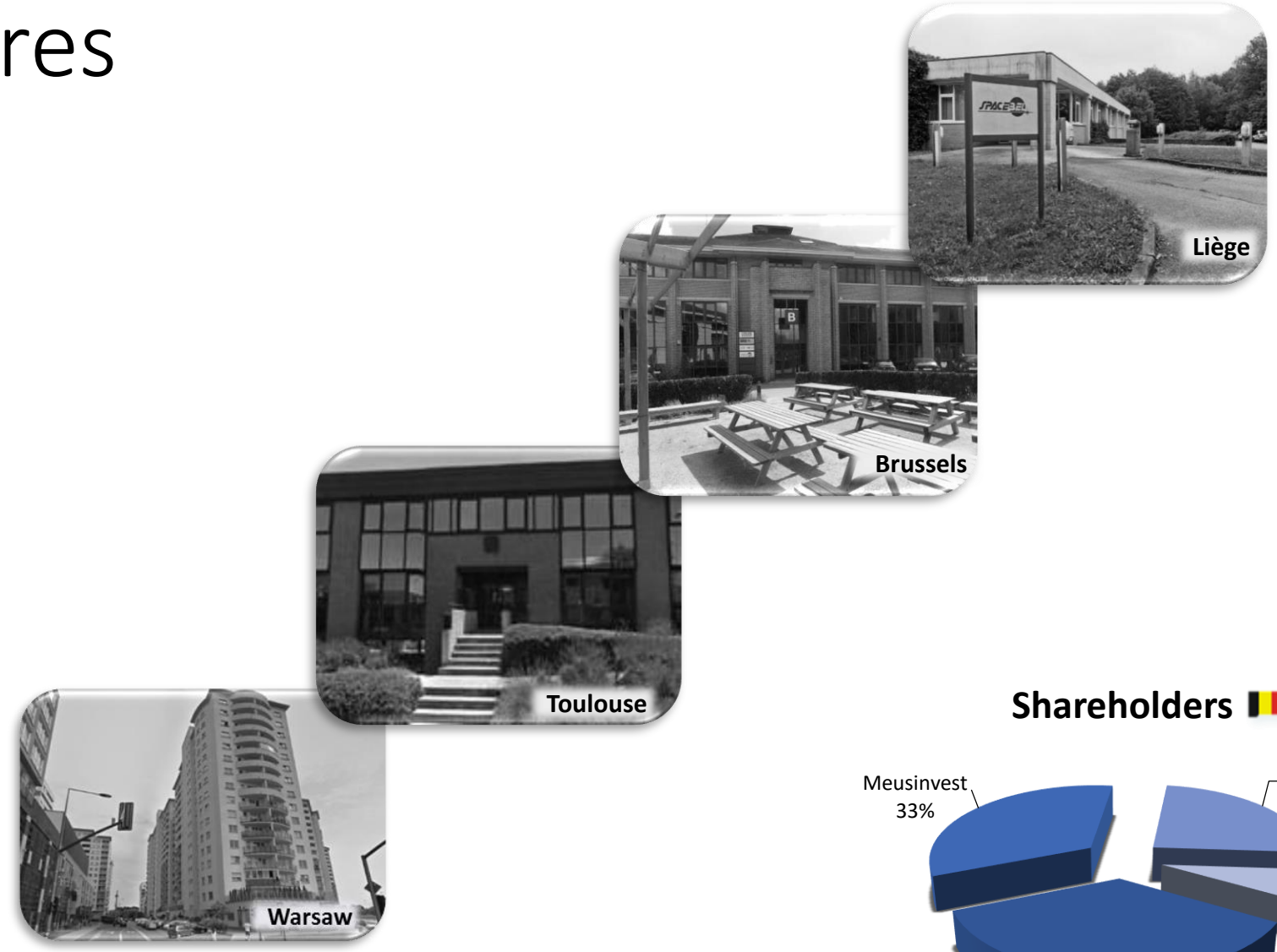
Geospatial Information & Systems
SPACEBEL

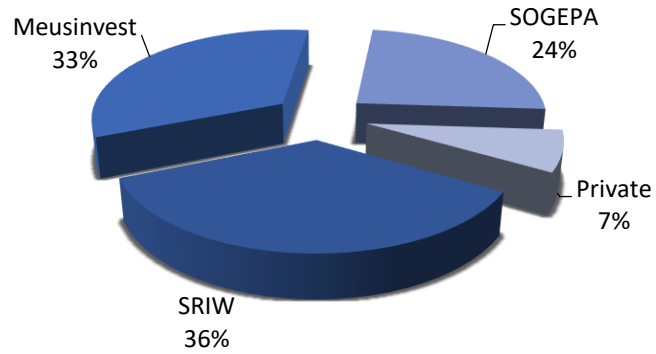

SPACEBEL

# SPACEBEL In Figures

- 30 Years in Space business
- 40 Space missions
- 2018 Sales 12 M€
- 98% Export
- 100 employees
- 3 subsidiaries
- 500m² clean rooms
- ISO 9001-2015
- 4 sites




**Shareholders**




# SPACEBEL Areas of Expertise

- On-board software
  - Satellite platforms / payloads
  - Launchers
- Simulators & emulators
  - From on board computers...
  - ... to overall orbital systems
- Mission & control centres
  - Mission analysis, planning, data processing
  - Satellite control centres
- Geospatial information & systems
  - EO thematic services, interoperability, WEB portal
  - Geospatial decision support solutions, SDI technology
- EO mini sat user requirements & system definition


## Programmes & Customers

- Earth Observation
  - Altius
  - Angels
  - Calipso
  - CSO
  - EarthCare
  - ERS-1,2
  - GEOSS
  - GMES (SSE,HMA)
  - GOCE
  - Helios
  - Jason-1,2,3
  - MetOp-SG
  - MTG
  - Myriade
  - Pleiades
  - PROBA-1
  - PROBA-V
  - SMOS
  - SPOT-4,-5
- Balloons
  - NOSYCA,
  - MEDON, VLD
- Launchers
  - Ariane 5, Vega
  - CDEAO
- Space flight
  - ATV/ISS
  - Columbus/ERA
  - Hermes
  - EXPERT, IXV
  - Space Rider
- Telecoms
  - Artemis
  - CERES
  - EDRS
  - INMARSAT-4
  - IRIS/ANTARES
  - NAPNCC, PEP
  - SAT-AIS
  - Small GEO
  - West Early Bird
  - WISDOM
- Multimission-Infra
  - BASILES-VTS (CIC)
  - EGS-CC, ISIS CPCC
- Science
  - COROT
  - Cluster
  - Euclid
  - Gaia
  - LISA-Pathfinder
  - PICARD
  - PROBA-2
  - PROBA-3
  - SOHO
  - SVOM
  - Taranis
  - VLT
- Exploration
  - LandSafe
  - Lunar Lander
  - Rosetta
  - SMART
- SSA
  - HERA
  - Space Weather
- Navigation
  - Galileo

**Space**

- Space Agencies (ESTEC, ESRIN, ESOC, ESAC, ESEC, CNES)
- Major aerospace companies (Airbus DS, OHB, Thales Alenia Space)

**Geospatial Information Systems**

- Regional governmental bodies
- Industry: Mining, Paper, ...
- EC, ISPRA, DLR, ...

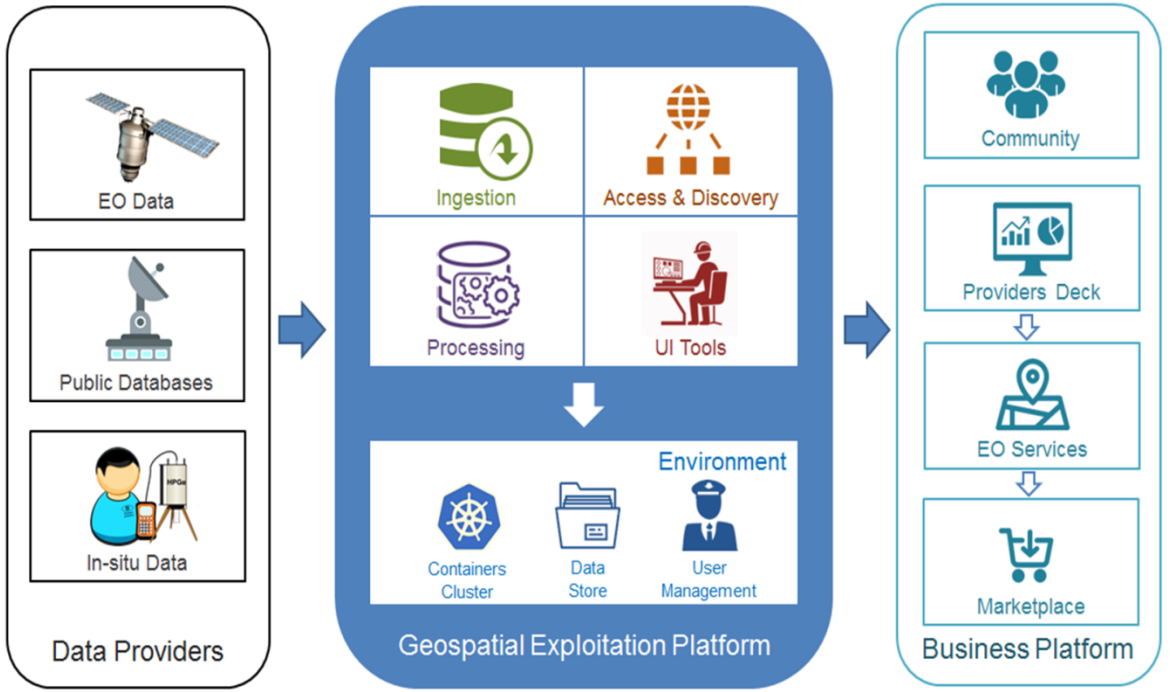
# EORegions!, The Project

01/04/16→31/03/19

**EO Regions!** develops the value chain for the valorization of earth observation services in COPERNICUS and the dynamic monitoring of territories at the level of the regions.

A "**Multi-thematic Regional Exploitation Platform**" composed by :

- a Geospatial Exploitation Platform (GEP)
- a Business Platform (BP)
- and an economic ecosystem of (thematic) users.




## Data & Service providers

## Users

**EORegions!** offers :

- **to managers, decision makers and citizens** a dynamic monitoring of their region
- **to SME and spin-offs** the opportunity to commercialize new and innovative services that are economically attractive, reach the market and develop it
- a simple and efficient system to **promote R&D results** towards new operational services

# OBJECTIVE: Costs reduction

## Reduction of the Commercial Costs :

- Business Platform « … As A Service » **business model**
- Value chains with data and service providers linked to several **delivery channels** :
  - EUGENIUS : www.eugenius-asso.eu
  - WUUDIS : www.wuudis.com
  - AgCelerant (NADIRA) : www.nadira-project.eu
  - …
- Commercial leads organization : consortia, specialization

## Reduction of the Production Costs : in GEP,

- Data access and management
- Re-Use, process and results sharing
- Automatic processing of recurrent tasks

# Example 1 : **Rice Parcel Preparedness in NADIRA**

## De-risking agriculture through Earth Observation

1 – Absence of plowing by farmer indicates delayed preparedness and higher risk of defaulting on loan reimbursement, either from diversion of purpose or depressed yield arising from late fertilization. Credit disbursement is stalled, pending farmer corrective action.

2 – Detection with SENTINEL data of effective field plowing by farmer triggers clearance for the bank to release a first credit instalment for fertilizer purchase, unlocking dispatch of inputs, etc. Continuous monitoring of farmer management and crop response until harvest strengthens a virtuous cycle of best agronomic and transactional practice, de-risking investments across the entire value chain.



*The NADiRA project receives funding from the European Union's Horizon 2020 resarch and innovation programme under grant agreement No 776309.*

# Example 1 : **Rice Parcel Preparedness**

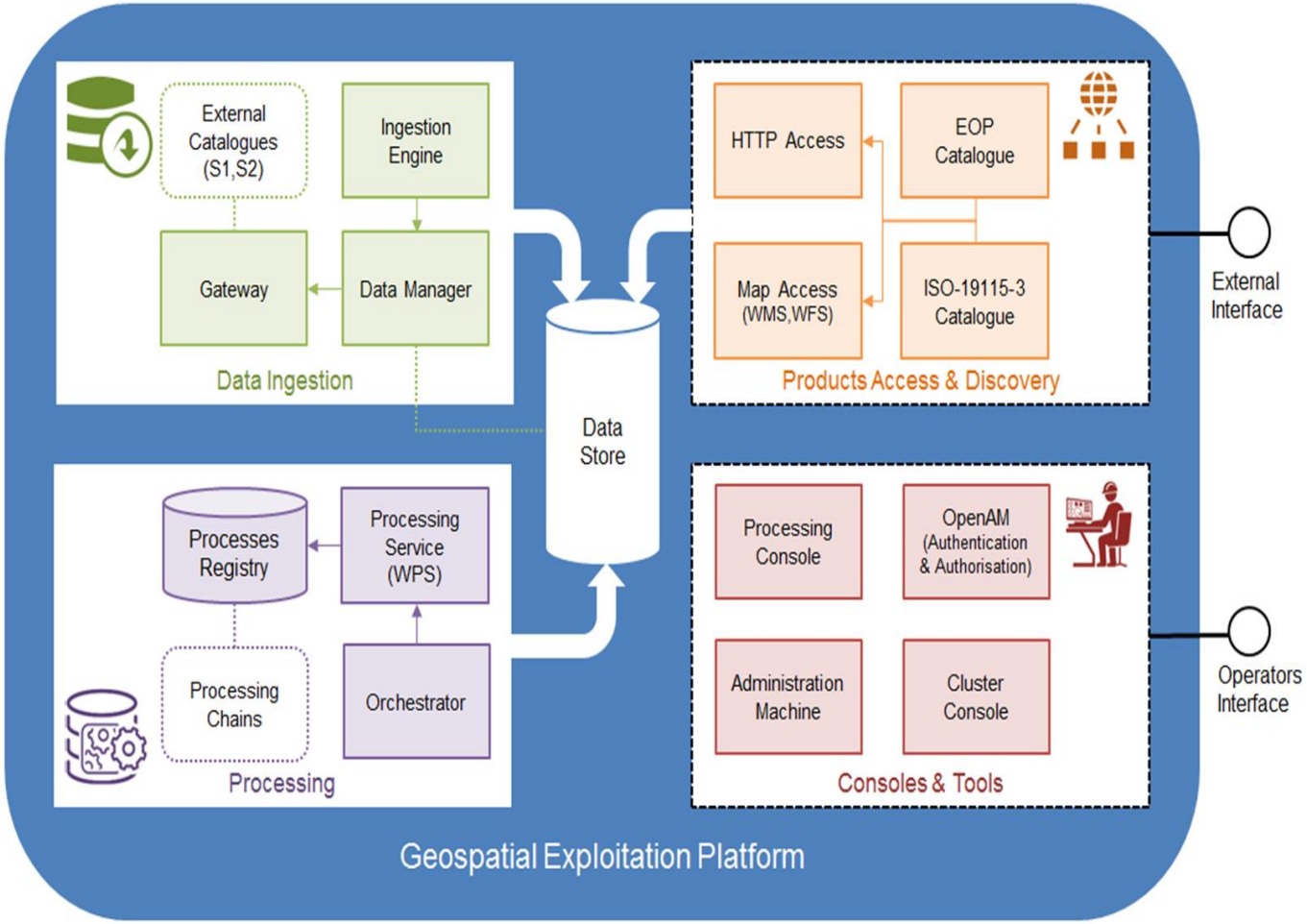
**EORegions! and its Geospatial Exploitation Platform (GEP) :**

1 – Collect and prepare necessary data

2 – Execute automatically recurrent process to produce information

3 – Create MTD and make results accessible in a catalogue

4 – Results automatically harvested and delivered to end-user through AgCelerant




# Example 2 : Significant Vegetation Changes Detection

**SPACEBEL's Dynamic Forest Monitoring** provides forestry services. The services are based on SENTINEL images in combination with reference data collected in the field. For services requiring higher resolution input data, VHR satellite data (*e.g.* Pléiades) are used.

4 cost-effective information at local to regional scales to private forest owners and public authorities are proposed:

SF1 - Significant Vegetation Changes Detection

SF2 - Vegetation Mask and Deciduous/Coniferous Classification

SF3 - Major Tree Species Identification

SF4 – Forest Inventory at Parcel Scale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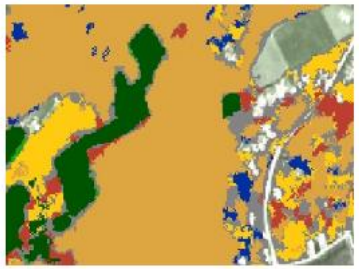
# Discover the EOR services

ALL CATEGORIES / FOREST / SUBSIDENCE / AGRICULTURE



## SF3 - Identification des principales essences forestières

Où se trouvent les essences forestières principales exploitables?
Quelles sont les essences principales présentes dans ma forêt et comment sont-elles réparties ?
Comment stratifier mon inventaire selon les grands types d'essence ?

More details

## Détermination des dates de mise sous eau des rizières

Le service de détection des mises sous eau des parcelles permet aux assureurs de (re)calculer leurs primes, aux banquier de savoir quand effectuer un versement de prêt et aux gestionnaires et aux Agro-industriels de contrôler le calendrier de récolte.

More details

## SF1 - Cartographie des changements significatifs de la végétation

Une mise à blanc ou un changement de végétation important a-t-il eu lieu à proximité de ma propriété ?
Des coupes ont-elles eu lieu dans des zones Natura 2000. Où sont localisées les zones récemment déforestées en Wallonie?

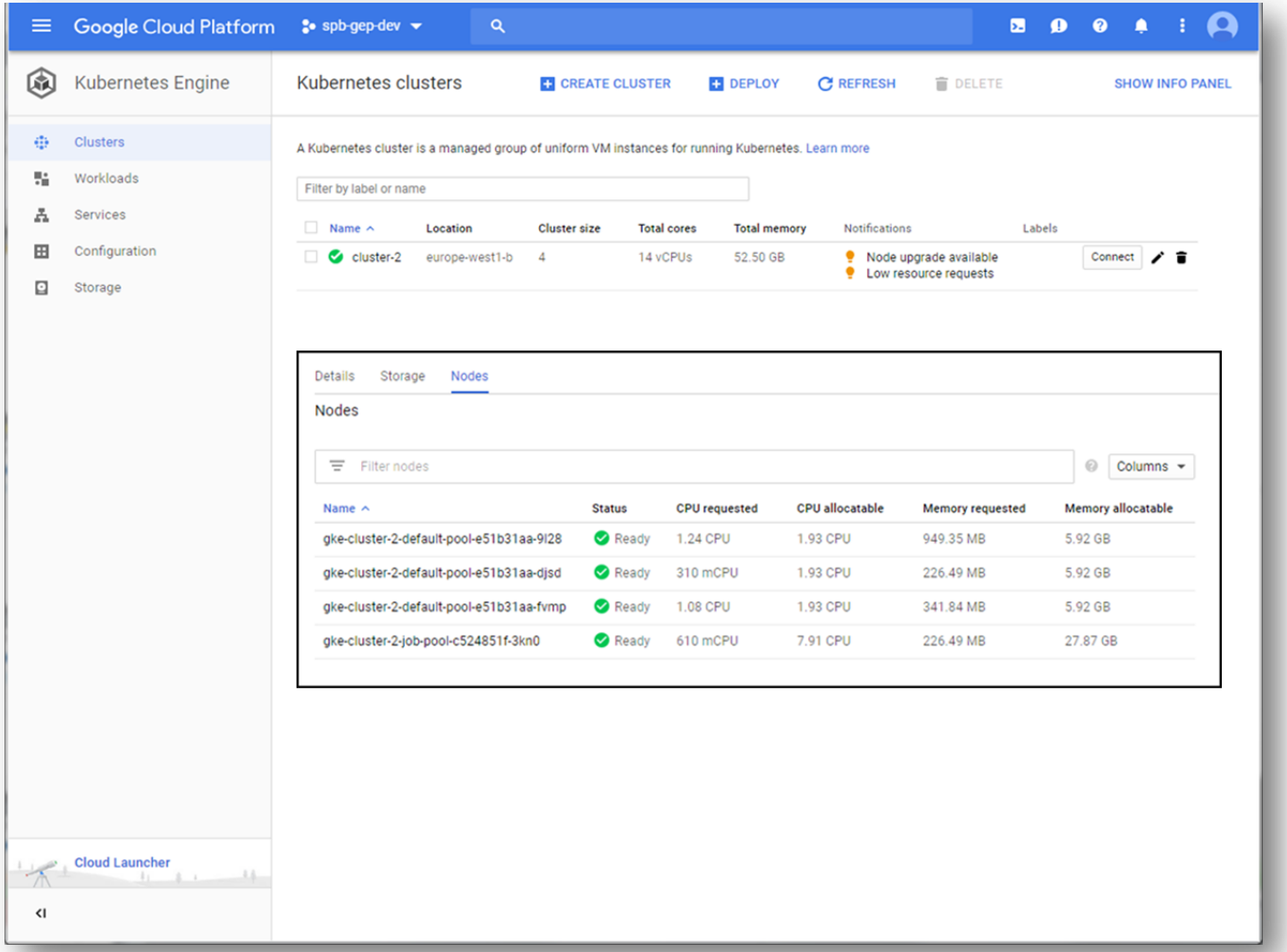
More details

# **EORegions!**, a tool to support AI Implementation

## GEP on Kubernetes cluster on Google Cloud Platform

EORegions! provides :

- Access to data :
  - EO (Copernicus)
  - From other sources (existing geodata, field data, training datas, …)
  - Re-use of results from existing EO services
- Infrastructure with scalable computer power and storage
- Facilities to discovery (automatic creation of MTD, catalogues)
- and share results (business platform, distribution channels)





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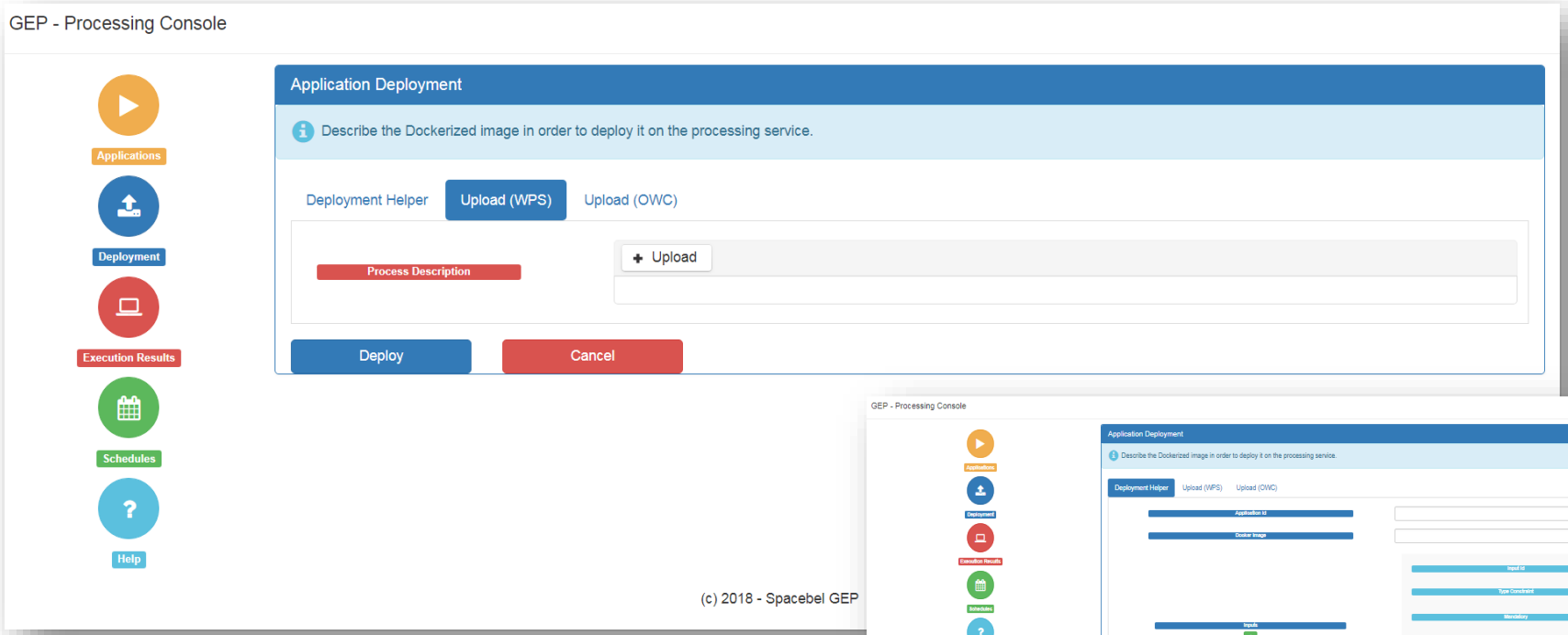
# EORegions!, a tool to support AI Implementation




GEP Processing Console

Process deployment

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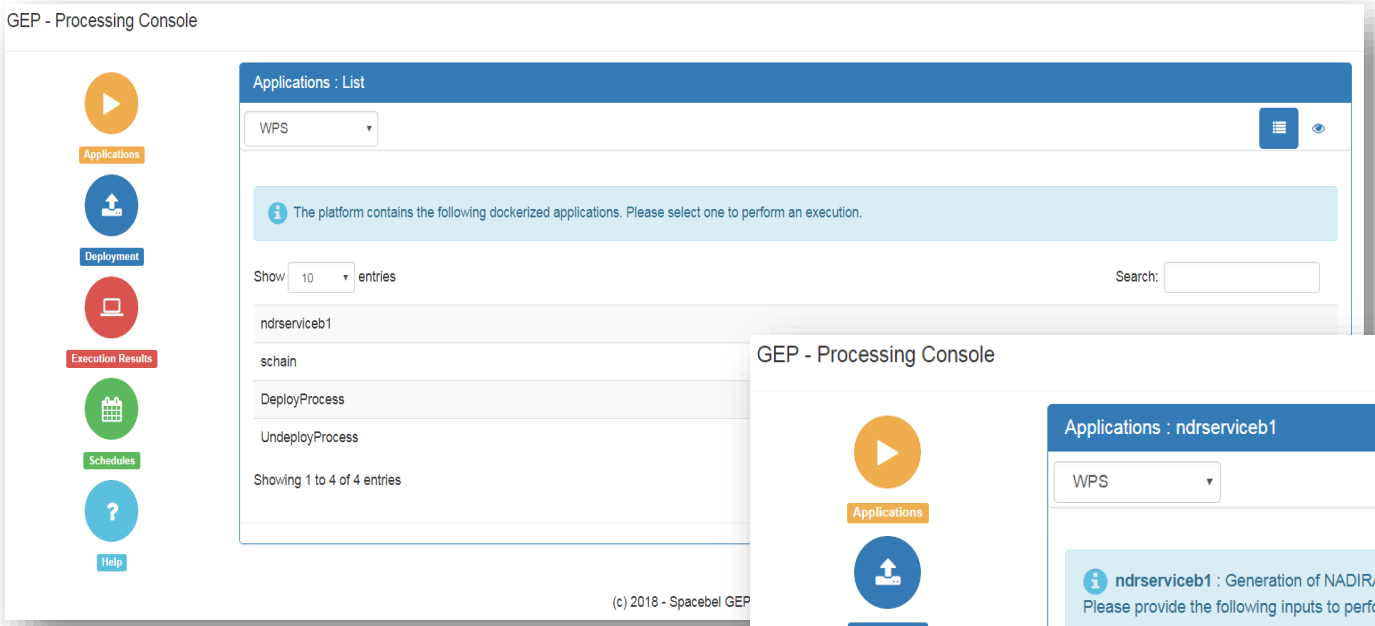
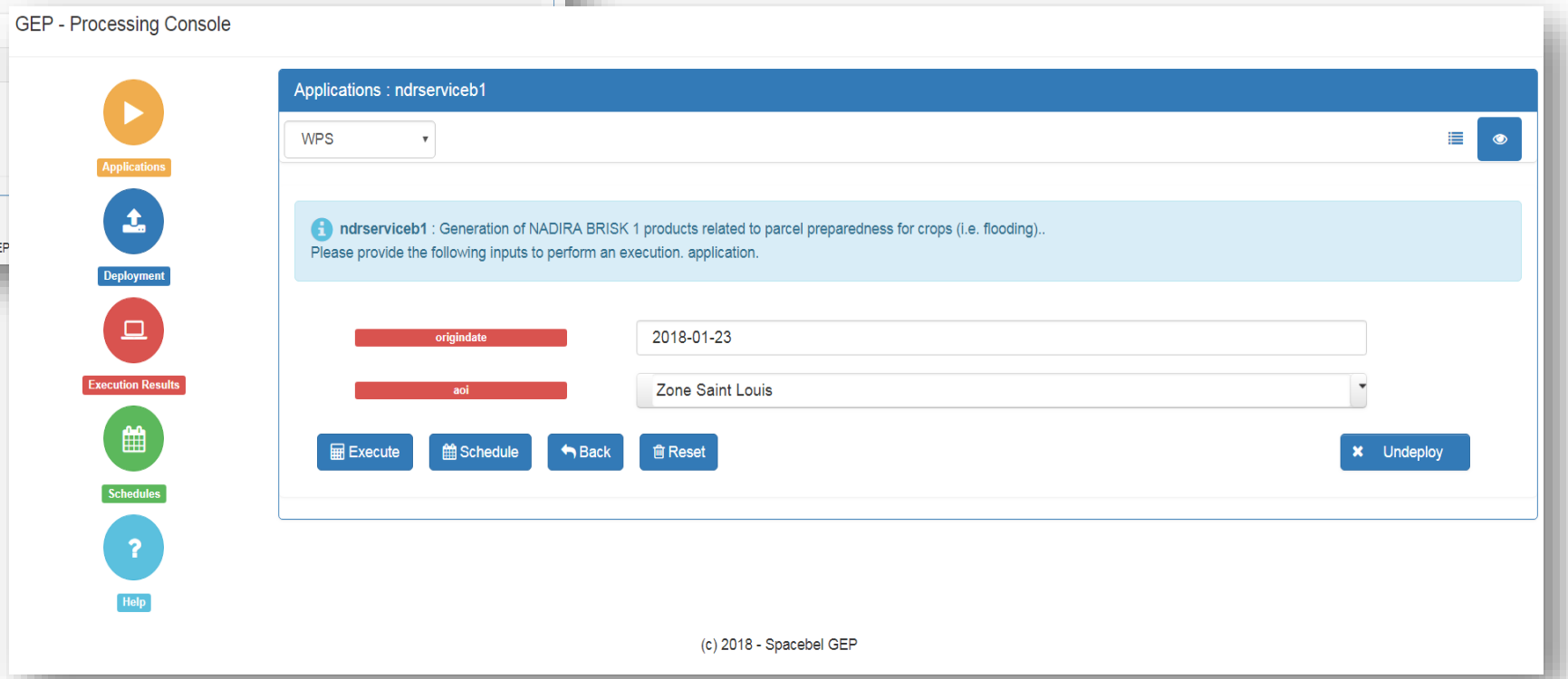
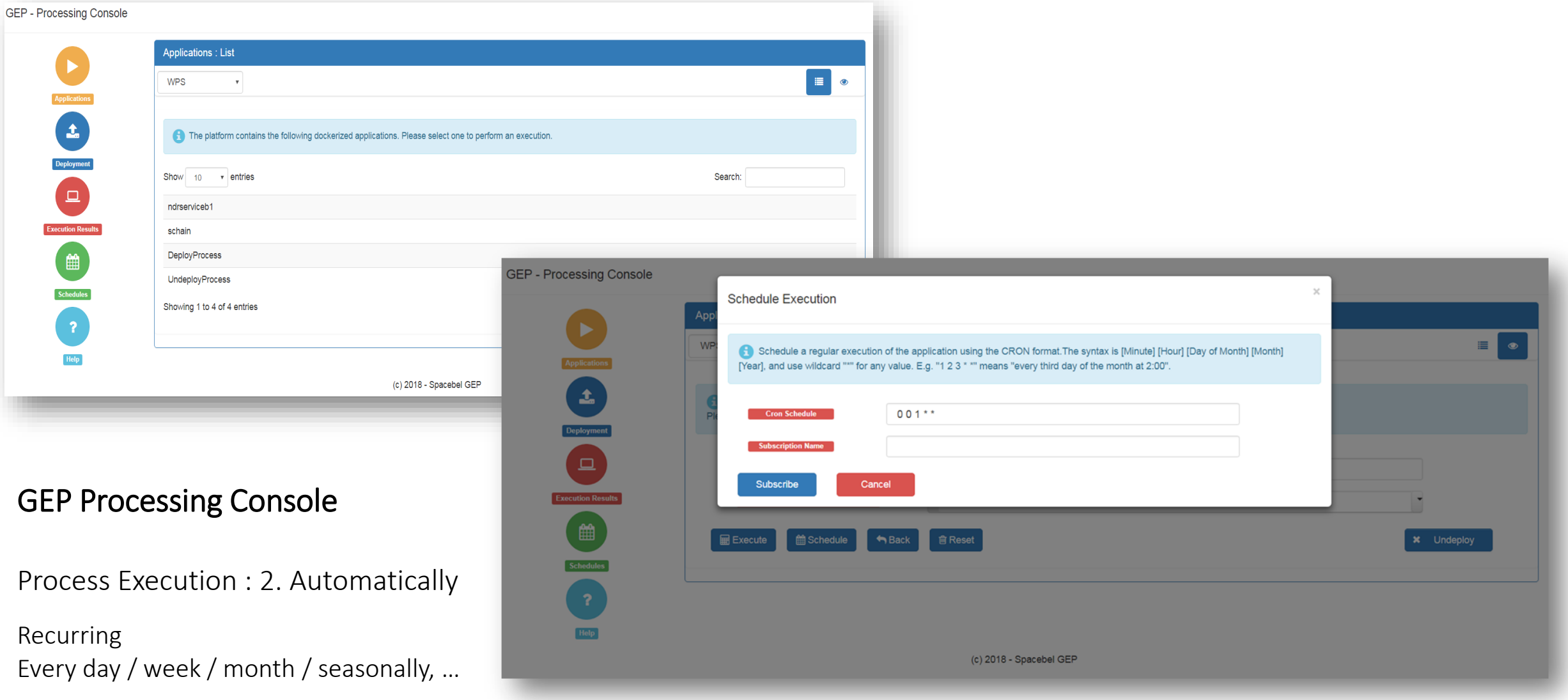



GEP Processing Console

Process Execution : 1. On-Demand

# EORegions!, a tool to support AI Implementation

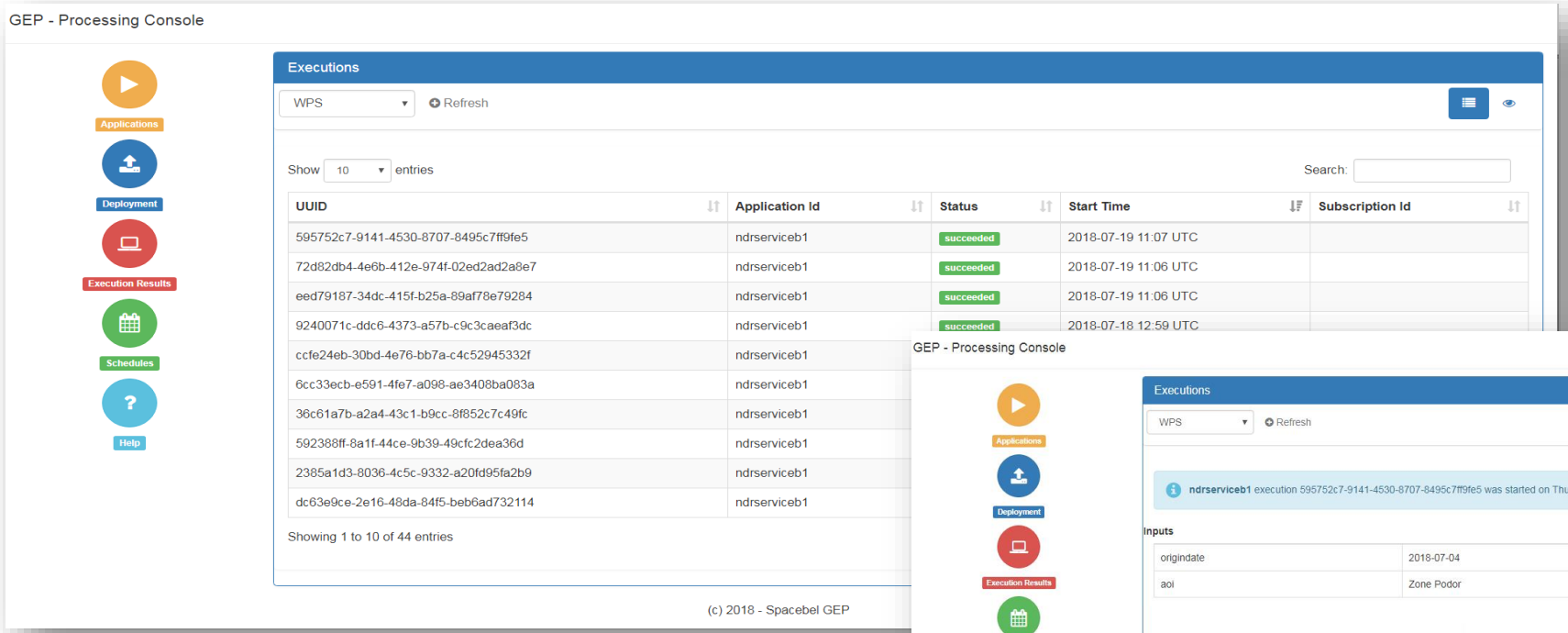


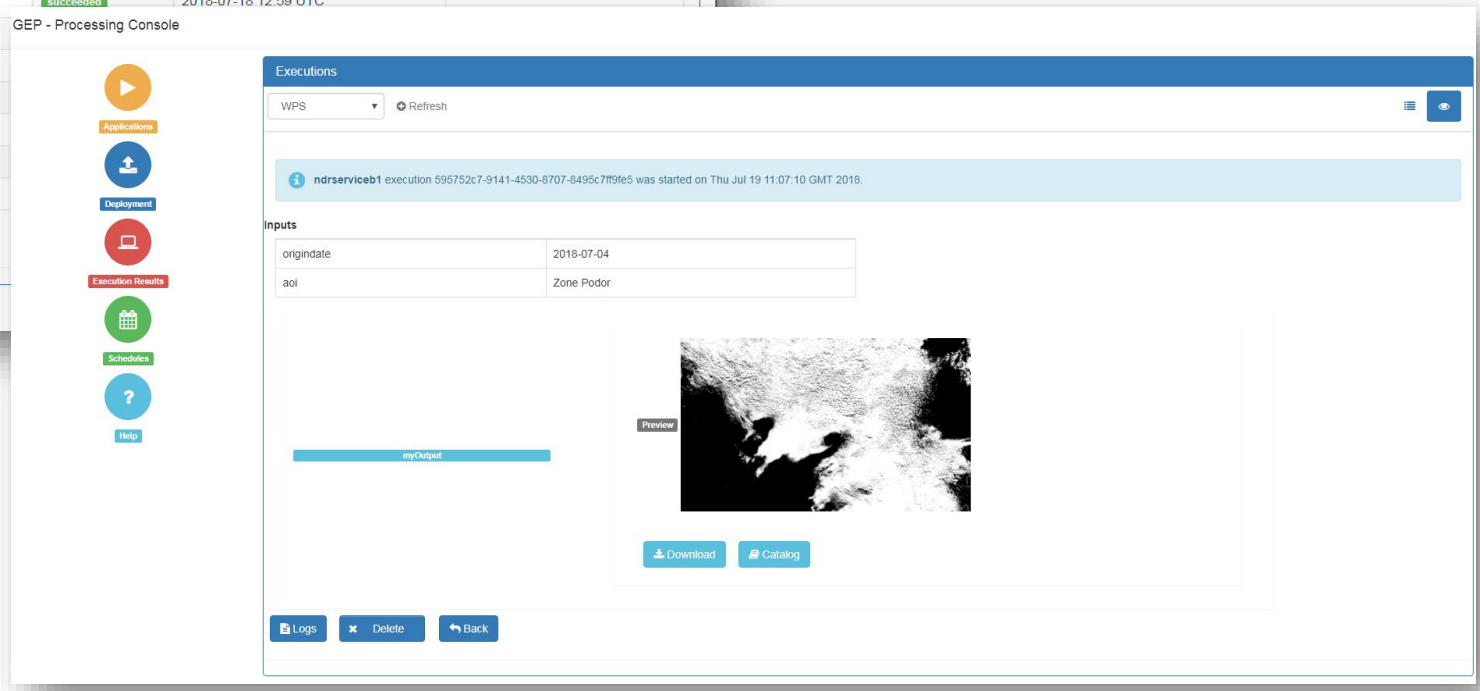

## GEP Processing Console

Process Execution : 2. Automatically

Recurring
Every day / week / month / seasonally, …

# EORegions!, a tool to support AI Implementation




## GEP Processing Console

Results status and visualization

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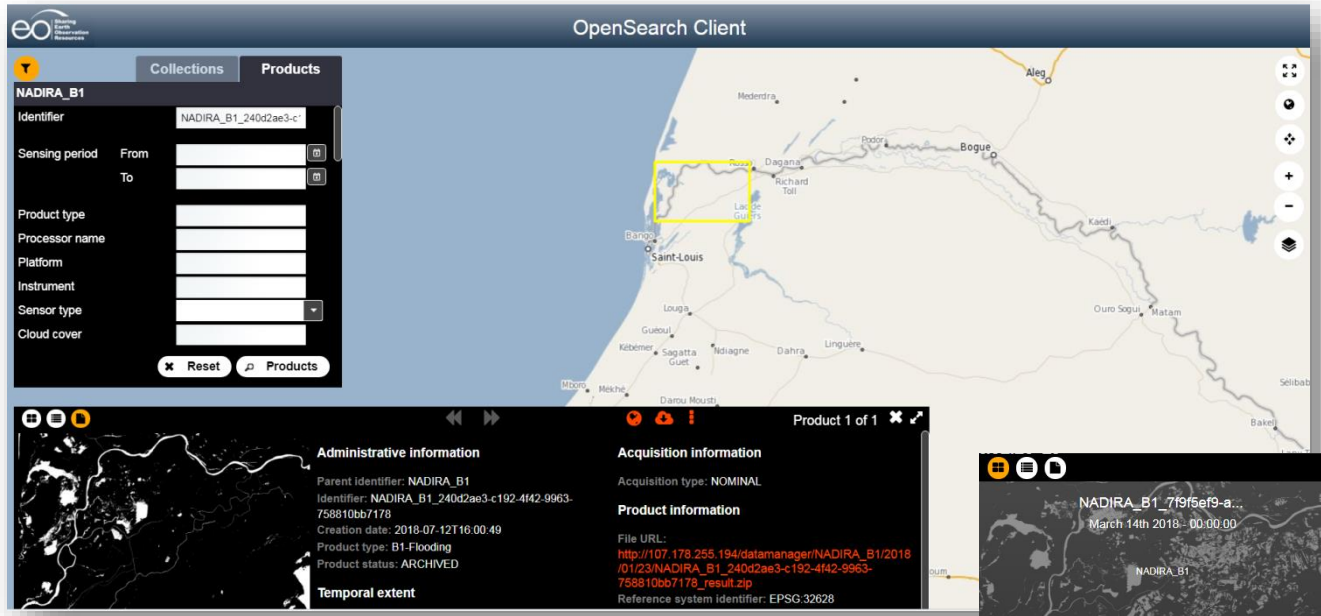


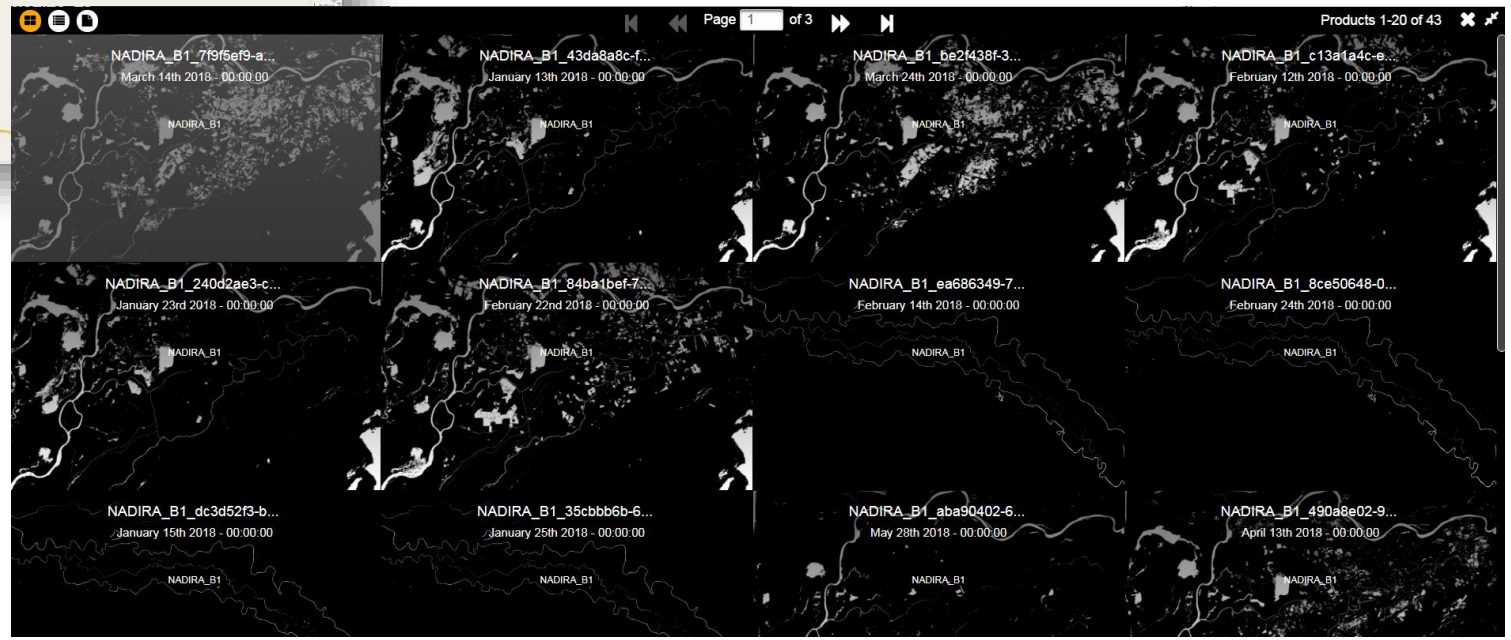


Visualization of all results of **Rice Parcel Preparedness** available on an area within a time frame


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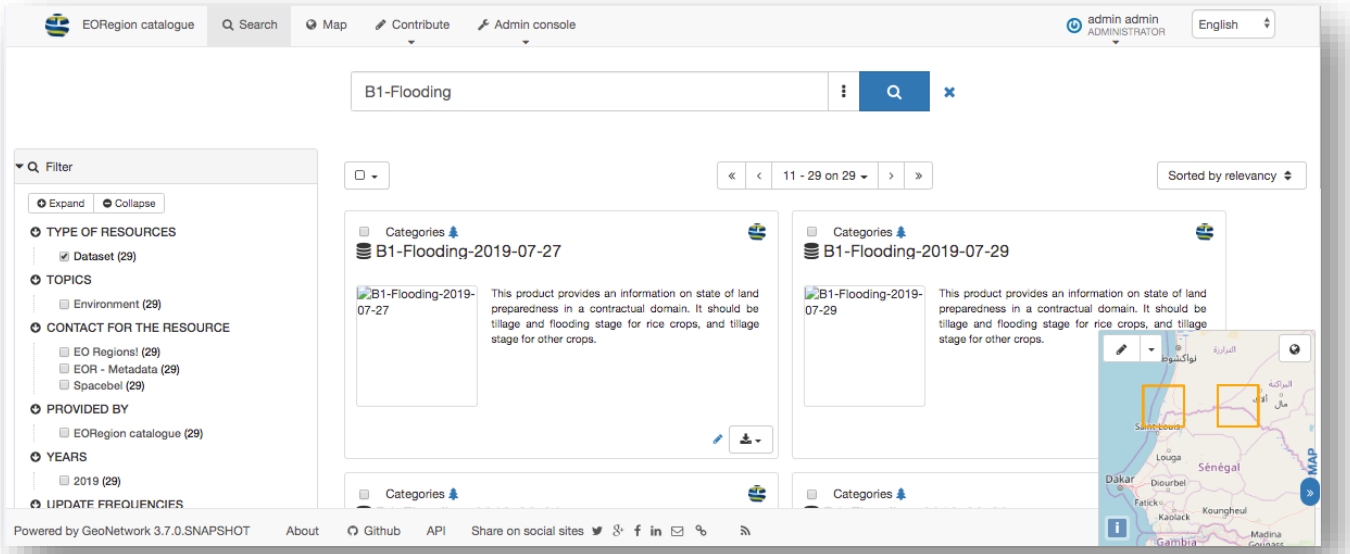


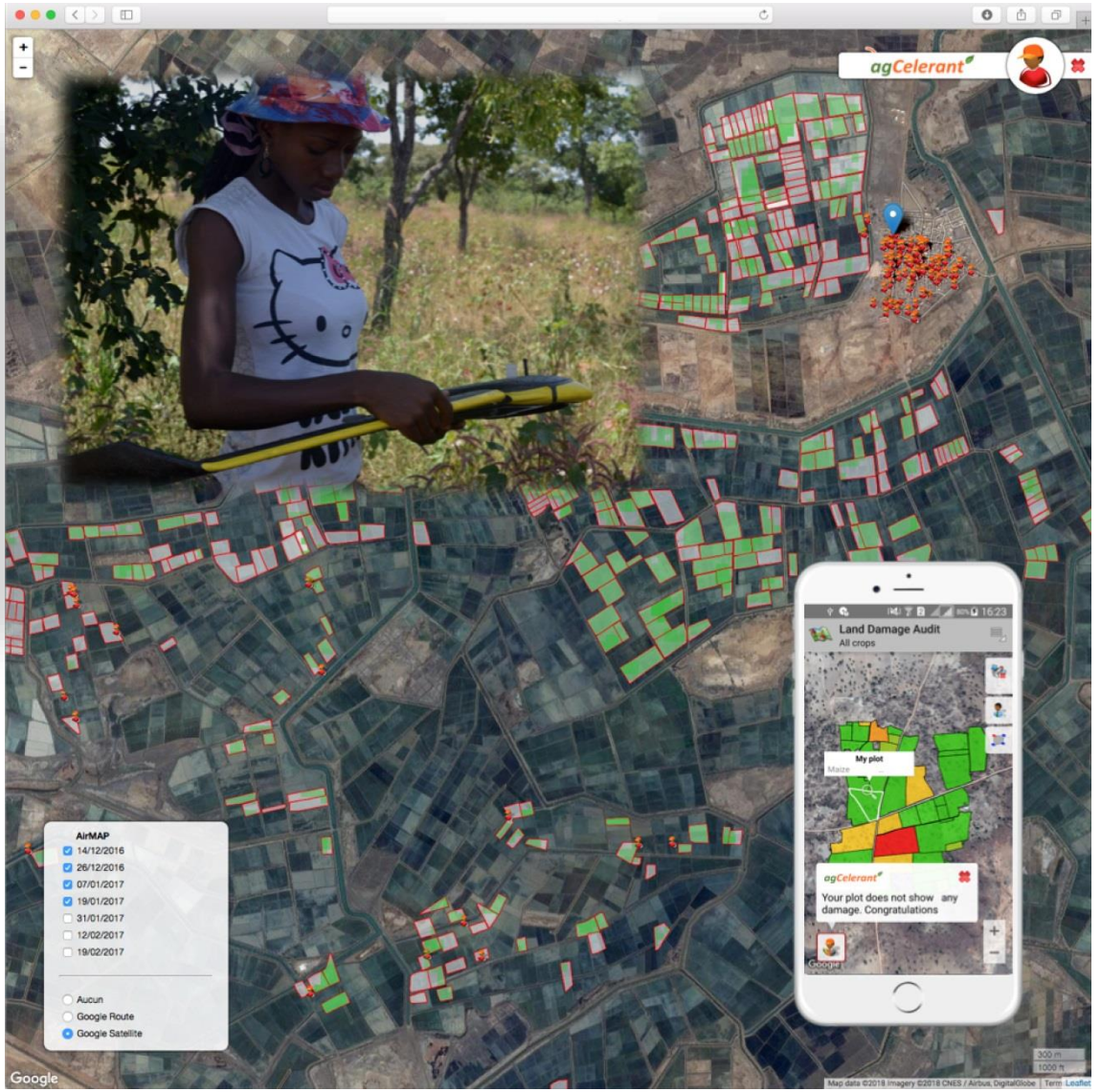


Automatic **METADATA** creation, discovery through **catalogue**

Harvested by **delivery channel** : Ag Celerant

agCelerant
PHYGITAL AGRICULTURE


NADiRA

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# EORegions!, a tool to support AI Implementation

As a Conclusion,

- EO provides a big amount of data to monitor a territory. On one hand, **AI can solve, enhance and reduce the production costs** of the treatement of this large amount of data.

- On the other hand, **EO can also feed AI processes with information about changing environment and parameters**.

- EORegions! can provide **access to infrastructure** to run and implement AI processes ; give **access to different data sources** (EO, training, ancillary) and to **scalable computer power and storage**.

**SPACEBEL is interested in collaborating with AI experts** to work on spatio-temporal analysis for forestry, agriculture, climate and biodiversity monitoring .

# Thank you for your attention !

EARTH OBSERVATION REGIONS !

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