

# EORegions!, a tool to support AI Implementation



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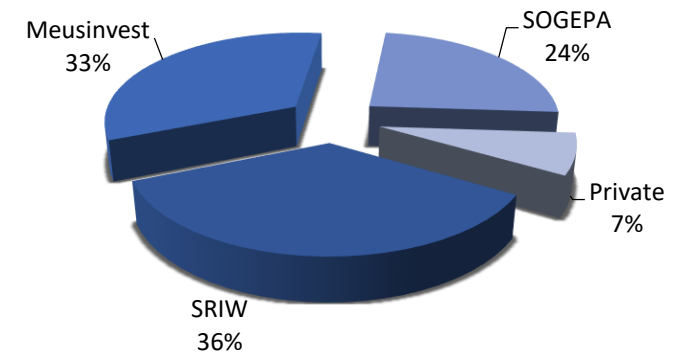


# SPACEBEL In Figures

- 30 Years in Space business
- 40 Space missions
- 2018 Sales 12 M€
- 98% Export
- 100 employees
- 3 subsidiaries
- 500m<sup>2</sup> clean rooms
- ISO 9001-2015
- 4 sites



## Shareholders



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# 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, ...

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# 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.**

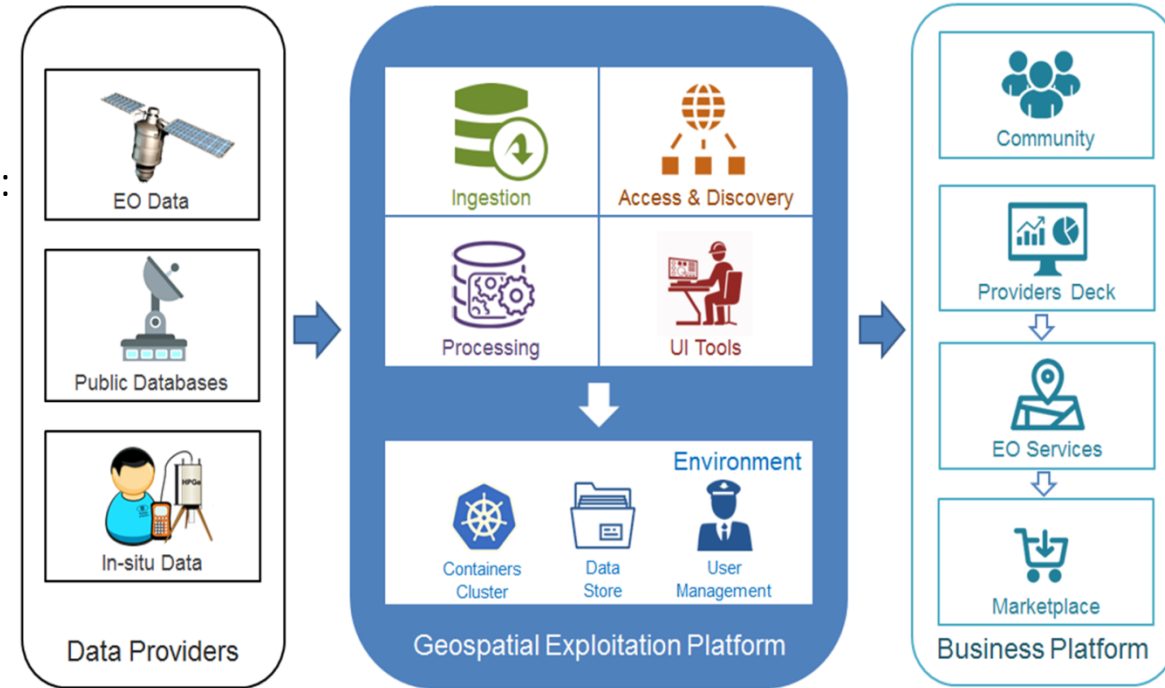
A “Multi-thematic Regional Exploitation Platform” composed by :

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

## Data & Service providers

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](http://www.eugenius-asso.eu)
  - WUUDIS : [www.wuudis.com](http://www.wuudis.com)
  - AgCelerant (NADIRA) : [www.nadira-project.eu](http://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.

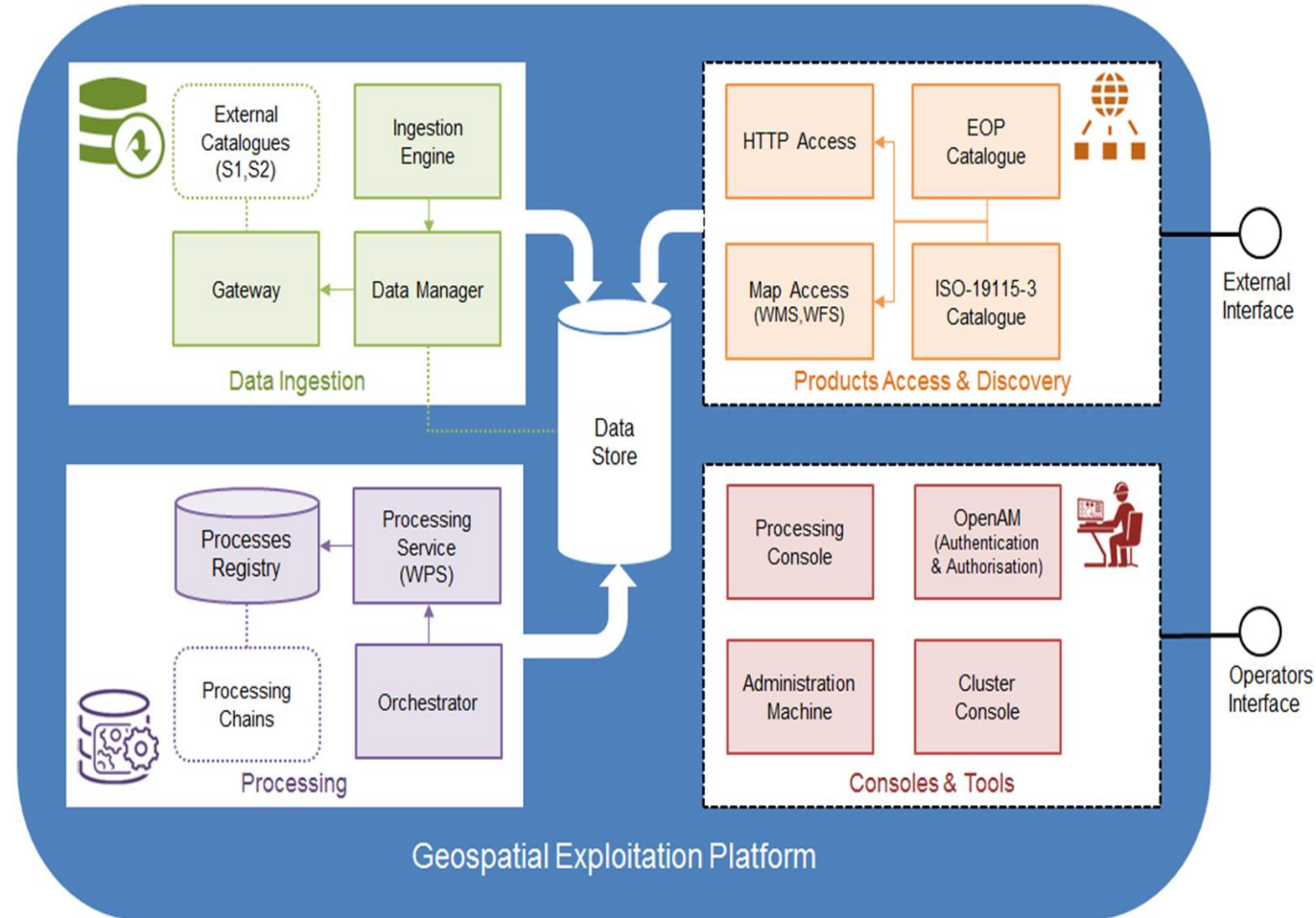
2 – Detection with SENTINEL data of effective field plowing by farmer triggers clearance for the bank to release a first credit instalment for fertilizer purchase, unlocking dispatch of inputs, etc. Continuous monitoring of farmer management and crop response until harvest strengthens a virtuous cycle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



# 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

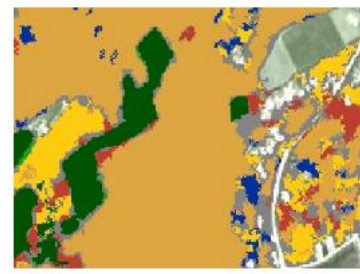






# Discover the EOR services

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)

The screenshot shows the Google Cloud Platform interface for Kubernetes Engine. The main view is 'Kubernetes clusters' for the project 'spb-gep-dev'. A cluster named 'cluster-2' is listed with a location of 'europe-west1-b', a size of 4, 14 vCPUs, and 52.50 GB of memory. The 'Nodes' tab is selected, showing a table of node details.

Name	Status	CPU requested	CPU allocatable	Memory requested	Memory allocatable
gke-cluster-2-default-pool-e51b31aa-9l28	Ready	1.24 CPU	1.93 CPU	949.35 MB	5.92 GB
gke-cluster-2-default-pool-e51b31aa-djds	Ready	310 mCPU	1.93 CPU	226.49 MB	5.92 GB
gke-cluster-2-default-pool-e51b31aa-fvmp	Ready	1.08 CPU	1.93 CPU	341.84 MB	5.92 GB
gke-cluster-2-job-pool-c524851f-3kn0	Ready	610 mCPU	7.91 CPU	226.49 MB	27.87 GB



# EORegions!, a tool to support AI Implementation

GEP - Processing Console

The screenshot shows the 'Application Deployment' section of the GEP Processing Console. On the left is a vertical navigation menu with icons for Applications, Deployment, Execution Results, Schedules, and Help. The main area has a blue header 'Application Deployment' and a light blue instruction box: 'Describe the Dockerized image in order to deploy it on the processing service.' Below this are tabs for 'Deployment Helper', 'Upload (WPS)', and 'Upload (OWC)'. The 'Upload (WPS)' tab is active, showing a 'Process Description' field with a '+ Upload' button. At the bottom are 'Deploy' and 'Cancel' buttons. A copyright notice '(c) 2018 - Spacebel GEP' is visible at the bottom right.

GEP Processing Console

Process deployment

GEP - Processing Console

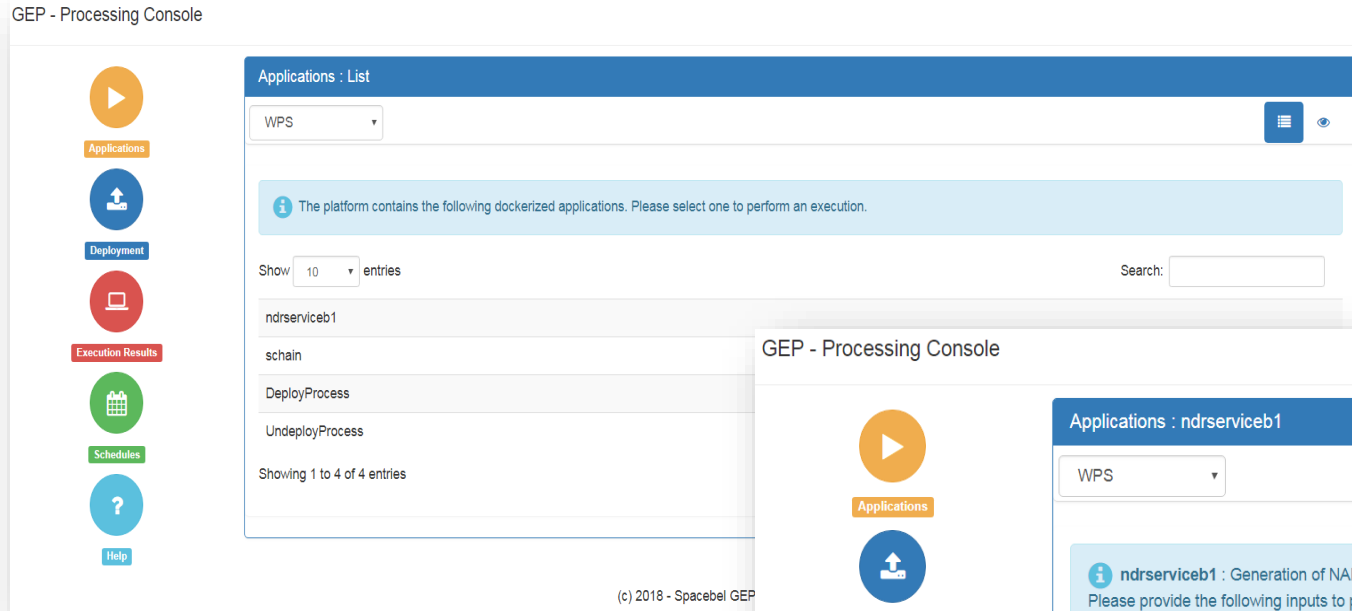
This screenshot shows the 'Application Deployment' screen with the 'Upload (WPS)' tab selected. The 'Process Description' field is filled with a redacted area. Below the description are two sections for 'Input' and 'Output'. Each section has a 'Type Constraint' dropdown and an 'Environment Variable' field. The 'Input' section has a 'myInput' field and a 'File (url)' dropdown. The 'Output' section has a 'myOutput' field and a 'File (raw)' dropdown. There are 'Previous' and 'Next' buttons at the bottom right of each section. A copyright notice '(c) 2018 - Spacebel GEP' is visible at the bottom right.

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# EORegions!, a tool to support AI Implementation

GEP - Processing Console



Applications : List

WPS

The platform contains the following dockerized applications. Please select one to perform an execution.

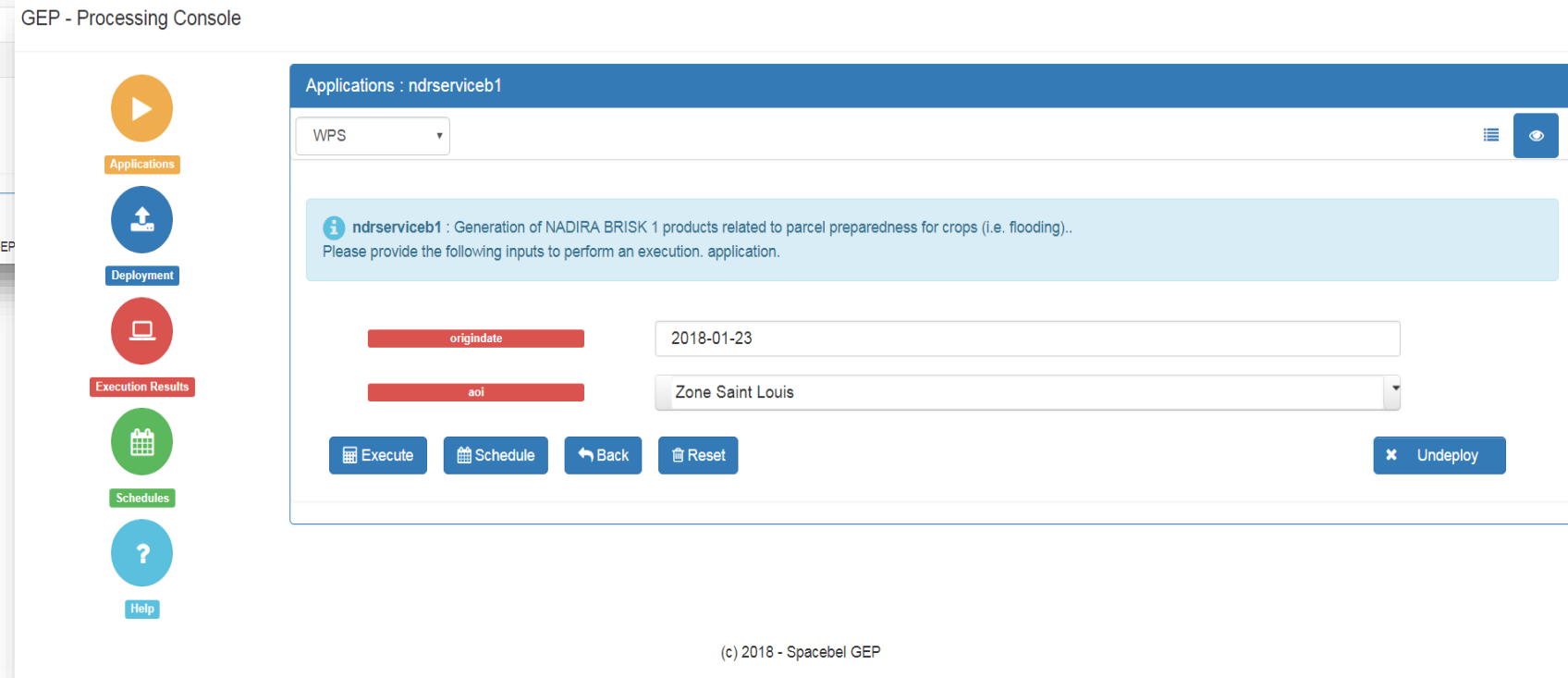
Show 10 entries Search:

- ndrservice1
- schain
- DeployProcess
- UndeployProcess

Showing 1 to 4 of 4 entries

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GEP - Processing Console



Applications : ndrservice1

WPS

ndrservice1 : Generation of NADIRA BRISK 1 products related to parcel preparedness for crops (i.e. flooding).. Please provide the following inputs to perform an execution. application.

origindate 2018-01-23

aoi Zone Saint Louis

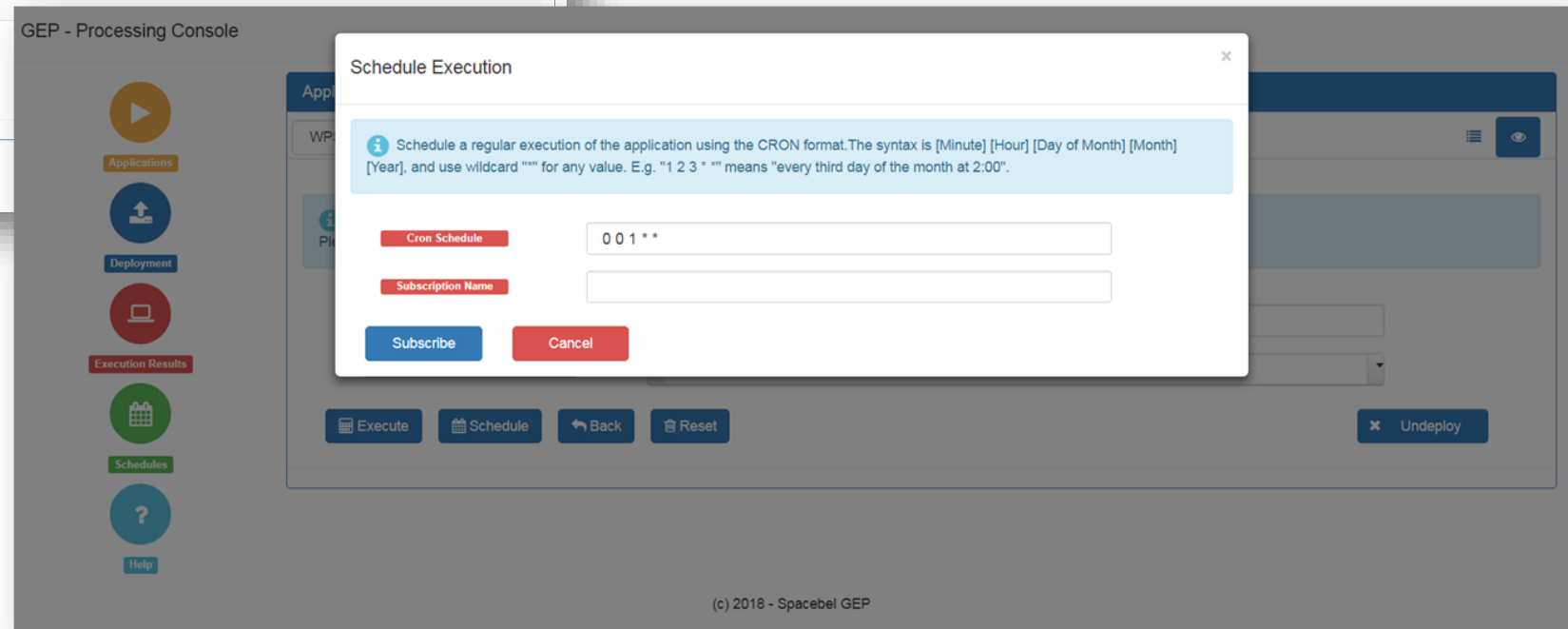
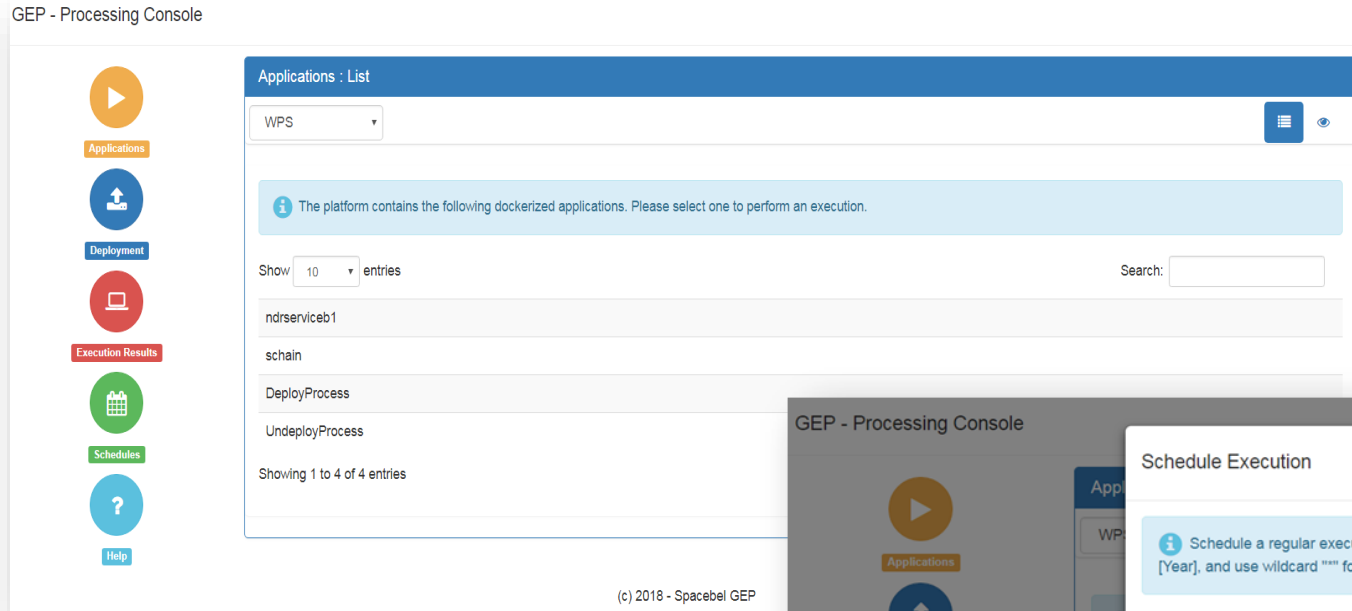
Execute Schedule Back Reset Undeploy

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GEP Processing Console

Process Execution : 1. On-Demand

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## GEP Processing Console

Process Execution : 2. Automatically

Recurring

Every day / week / month / seasonally, ...



# EORegions!, a tool to support AI Implementation

GEP - Processing Console

Applications

Deployment

Execution Results

Schedules

Help

Executions

WPS Refresh

Show 10 entries Search:

UUID	Application Id	Status	Start Time	Subscription Id
595752c7-9141-4530-8707-8495c7f9fe5	ndrservice1	succeeded	2018-07-19 11:07 UTC	
72d82db4-4e6b-412e-974f-02ed2ad2a8e7	ndrservice1	succeeded	2018-07-19 11:06 UTC	
eed79187-34dc-415f-b25a-89af78e79284	ndrservice1	succeeded	2018-07-19 11:06 UTC	
9240071c-ddc6-4373-a57b-c9c3caef3dc	ndrservice1	succeeded	2018-07-18 12:59 UTC	
ccfe24eb-30bd-4e76-bb7a-c4c52945332f	ndrservice1			
6cc33ecb-e591-4fe7-a098-ae3408ba083a	ndrservice1			
36c61a7b-a2a4-43c1-b9cc-8f852c7c49fc	ndrservice1			
592388ff-8a1f-44ce-9b39-49cfc2dea36d	ndrservice1			
2385a1d3-8036-4c5c-9332-a20fd95fa2b9	ndrservice1			
dc63e9ce-2e16-48da-84f5-beb6ad732114	ndrservice1			

Showing 1 to 10 of 44 entries

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GEP - Processing Console

Applications

Deployment

Execution Results

Schedules

Help

Executions

WPS Refresh

ndrservice1 execution 595752c7-9141-4530-8707-8495c7f9fe5 was started on Thu Jul 19 11:07:10 GMT 2018.

Inputs

origindate	2018-07-04
aol	Zone Podor

myOutput

Preview

Download Catalog

Logs Delete Back

GEP Processing Console

Results status and visualization



# EORegions!, a tool to support AI Implementation

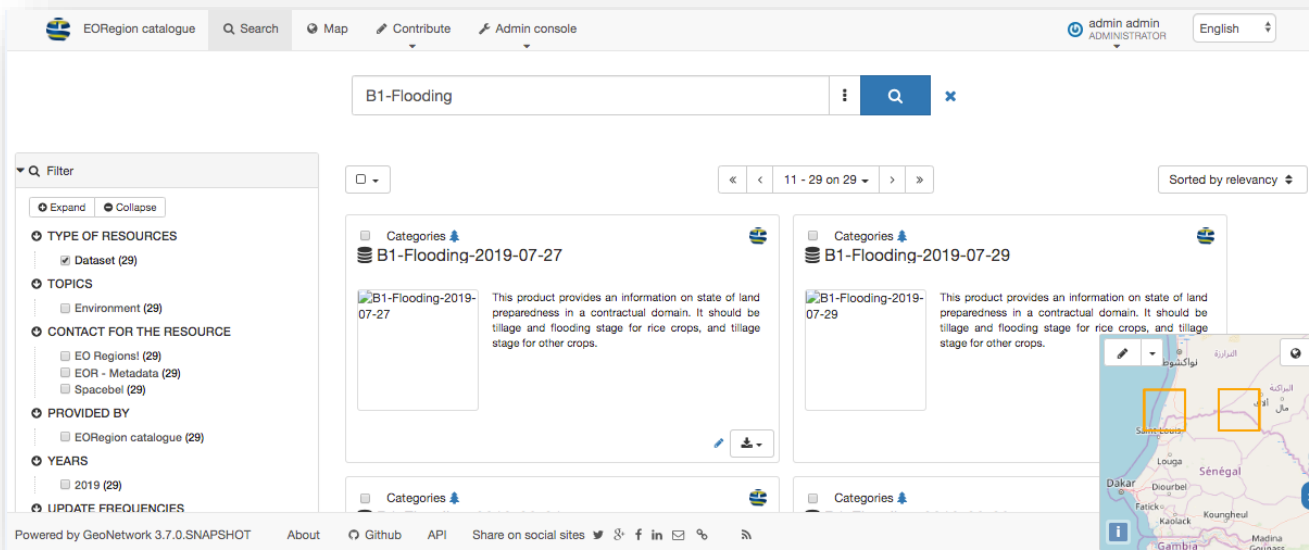
The screenshot shows the OpenSearch Client interface. On the left, there is a sidebar with filters for 'Collections' and 'Products'. The 'Products' filter is active, showing a list of filters including Identifier, Sensing period (From/To), Product type, Processor name, Platform, Instrument, Sensor type, and Cloud cover. Below the filters are 'Reset' and 'Products' buttons. The main area displays a map of Senegal with a yellow bounding box around a region near Saint-Louis. A bottom panel shows 'Product 1 of 1' with administrative, acquisition, and product information.

Administrative information	Acquisition information
Parent identifier: NADIRA_B1	Acquisition type: NOMINAL
Identifier: NADIRA_B1_240d2ae3-c192-4f42-9963-758810bb7178	Product information
Creation date: 2018-07-12T16:00:49	File URL: <a href="http://107.178.255.194/datalamanager/NADIRA_B1/2018/01/23/NADIRA_B1_240d2ae3-c192-4f42-9963-758810bb7178_result.zip">http://107.178.255.194/datalamanager/NADIRA_B1/2018/01/23/NADIRA_B1_240d2ae3-c192-4f42-9963-758810bb7178_result.zip</a>
Product type: B1-Flooding	Reference system identifier: EPSG:32628
Product status: ARCHIVED	
Temporal extent	

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

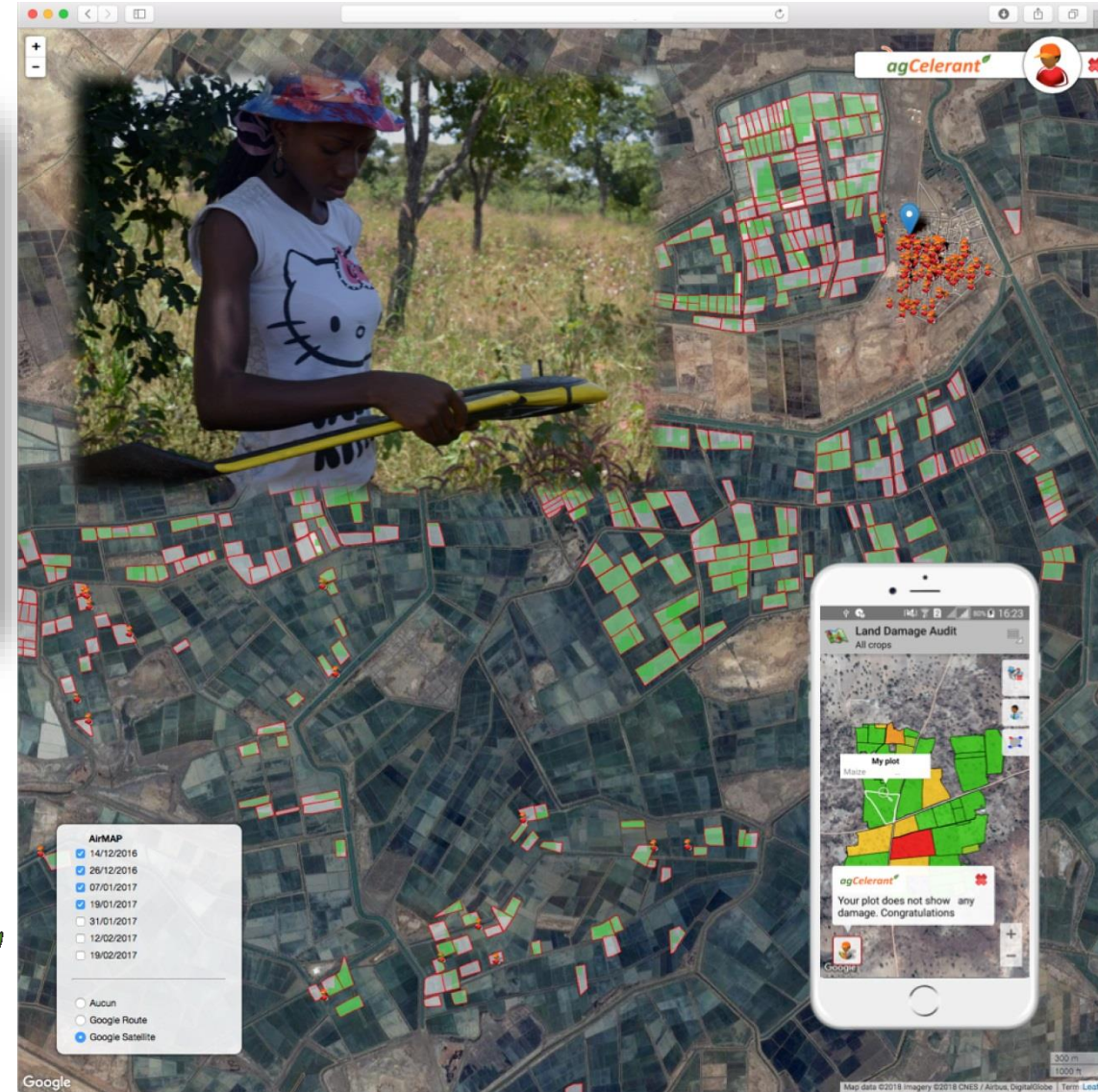
A grid of 12 satellite imagery thumbnails showing rice parcel preparedness over time. Each thumbnail includes a title, a date and time stamp, and the text 'NADIRA\_B1'. The thumbnails are arranged in two rows of six. The top row shows dates from March 14th to February 12th, and the bottom row shows dates from January 23rd to April 13th. The images show a progression of flooding and preparedness in the rice fields.

# EORegions!, a tool to support AI Implementation



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

Harvested by **delivery channel** : Ag Celerant



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





# 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 treatment 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 !



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