



CREODIAS
powered by  cloudmatters

THE CLOUD FOR EARTH OBSERVATION DATA PROCESSING

CEOS WGISS-48

Hanoi, Vietnam, October 8-11, 2019

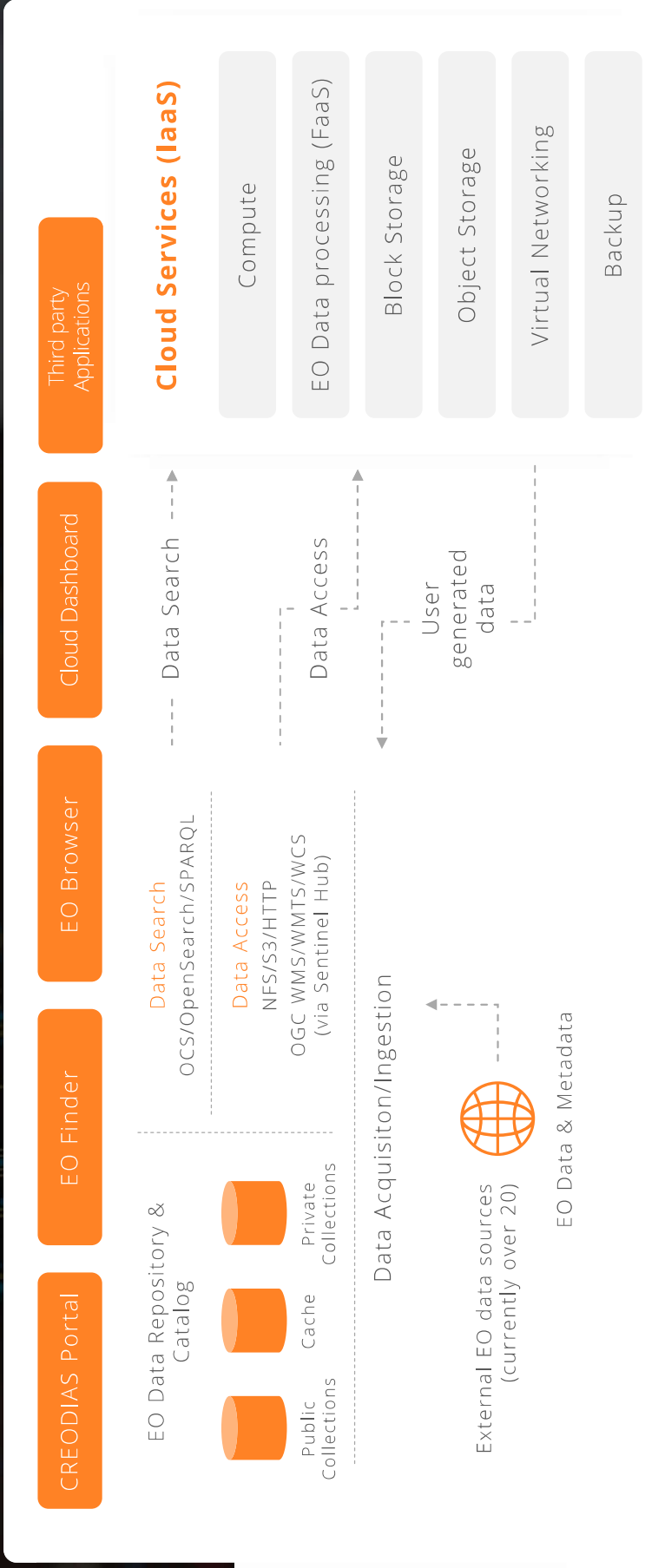


CREODIAS HIGHLIGHTS

- ✓ The leading cloud platform for EO Data processing
- ✓ Operating under ESA/EC contract
- ✓ Offering cloud services and tools for EO data storage, processing and dissemination
- ✓ Designed for the development and hosting of third party EO applications and data processing chains.



CREODIAS EXPLAINED



Cloud Services (IaaS)

Compute

EO Data processing (FaaS)

Block Storage

Object Storage

Virtual Networking

Backup

CREODIAS CLOUD SERVICES (IaaS)

● PROCESSING:

- ✓ Virtual Machines
- ✓ Dedicated Server VM-s
- ✓ VM-s with GPU
- ✓ Containers
- ✓ FaaS

● STORAGE:

- ✓ Block & Object
- ✓ HDD/SSD/NVMe
- ✓ Fully redundant
- ✓ Snapshots
- ✓ Backups

● OTHER SERVICES:

- ✓ Virtual Networks & Routers
- ✓ Firewalls
- ✓ Floating IP
- ✓ DNS
- ✓ VPN
- ✓ Load Balancer

CREODIAS CLOUD SERVICES (IaaS)

FULLY
INTEGRATED
WITH EO
REPOSITORY AND
CATALOGUE

BASED ON
OPENSTACK

ACCESSIBLE VIA
API AND GUI

SEPARATE
ADMINISTRATIVE
DOMAINS FOR
DIFFERENT
CUSTOMERS

CREODIAS DATA OFFER

Overview of original, uncompressed Earth Observation satellite data on CREODIAS. All data are indexed and available via CREODIAS Finder and API.

Datasets	Products	Instrument	Locally Held
Sentinel-1A & Sentinel-1B	GRD	SAR C-BAND	Full archive
	OCN		Last 6 months
	RAW		
	SLC		- Europe: full archive - Last 6 months / orderable
Sentinel-2A & Sentinel-2B	L1C	MSI	Full archive
	L2A		- Europe: last 6 months - Orderable */**, Cached ***
Sentinel-3A & Sentinel-3B	L1 SLSTR	SLSTR	Full archive
	L1 OLCI	OLCI	
	L1 SRAL	SRAL	
	L2 SLSTR (LST/WST)	SLSTR	
	L2 OLCI	OLCI	
	L2 SRAL	SRAL	
	L1B	TROPOMI	
L2 ****			
Sentinel-5P	L1G, L1T, L1GT	TM	Coverage of Europe, (1984-2011)
Landsat-5	L1G, L1T, L1GT	ETM	Coverage of Europe, (1999-2017)
Landsat-7	L1T, L1GT	OLI, OLI TIRS	Coverage of Europe, (2013- present)
Landsat-8	L1	MERIS	Global, (2002-2012)
Envisat	L1B, L1C, L2	MIRAS	Global, (2010-present)
SMOS			

* Can be ordered from ESA via CREODIAS Finder

** If L2A does not exist in ESA archive, it can be processed by CloudFerro with Sen2Cor

Kept in rolling cache of 1 PB (mostly European coverage). Oldest data will be removed when cache is full

Sentinel-5P L2 products currently stored: Aerosol, Cloud, CO, HCHO, NO2, NP, O3, SO2

COPERNICUS SERVICES DATA ON CREODIAS

Datasets	Products	Data access
CAMS (Atmosphere)	Selected collections	Accessible over S3 or NFS protocol
CEMS (Emergency)	Rapid mapping archive	Accessible over S3 or NFS protocol
CLMS (Land)	Selected collections	Accessible over S3 or NFS protocol
CMEMS (Marine)	All public collections	Accessible over S3 or NFS protocol

OTHER DATA COLLECTIONS ON CREODIAS

Datasets	Products	Instrument	Locally Stored Data	Data access
DEM	Mapzen	SRTM, others	Aggregation of several DEM sources	Accessible over S3 or NFS protocol
	SRTM	SRTM	Global (56S, 60N, 180W, 180E) February 2000	Accessible over S3 or NFS protocol
Jason-3	Altimeter	Altimeter	Since mission began	Accessible over S3 or NFS protocol
S2GLC	Sentinel-2 Global Land Cover	MSI	2017 analysis	Accessible over S3 or NFS protocol

REPOSITORY

- ✓ High capacity object storage for EO Data (currently over 16PB)
- ✓ Data stored in its original, uncompressed form – direct access to individual files
- ✓ Accessible over NFS and S3 protocols
- ✓ Direct file visibility in user VMs – no need to download
- ✓ Dynamic generation of OGC WMS/WMTS/WCS tiles (integrated Sentinel Hub)
- ✓ Storage of public and private data
- ✓ 1 PB cache area for data ordered or generated by users
- ✓ Possible dissemination to remote users

EO DATA ACQUISITION

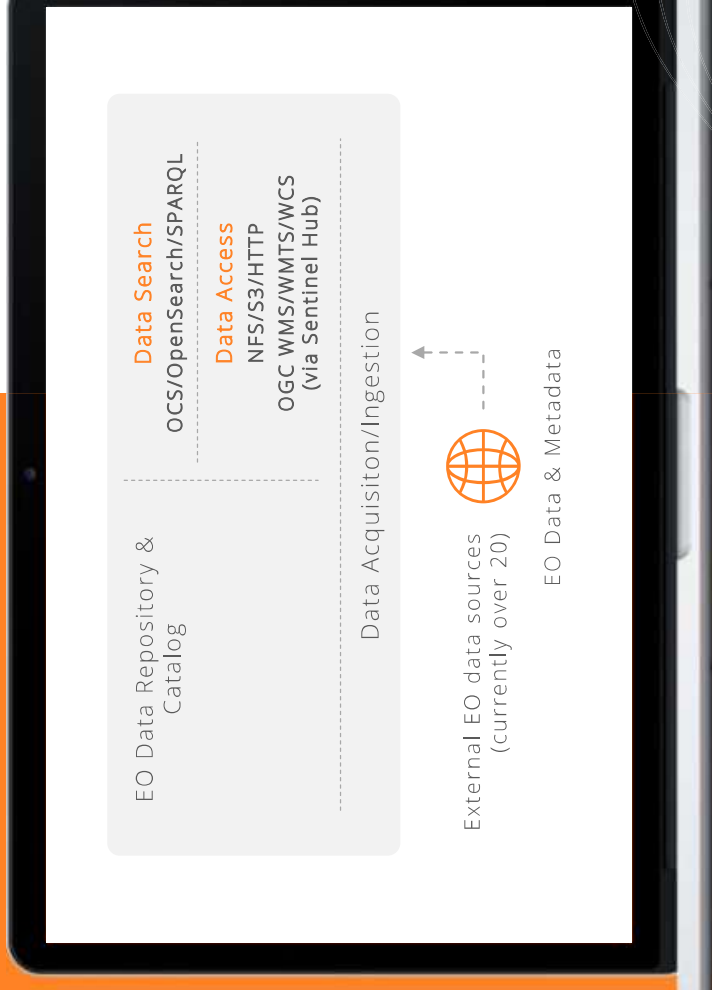
- ✓ Over 20 external EO data sources
- ✓ HTTP(S), (S)FTP, S3 and physical media transfer
- ✓ Optimized acquisition algorithm (parallelization, selection of fastest source)
- ✓ Fault tolerance and quality control
- ✓ Full data or metadata-only
- ✓ On demand acquisition (ordering)
- ✓ Subscription API for new products
- ✓ Customer-provided collections (restricted use)

DATA SEARCH

- ✓ Fast search based on collection, AOI, time, cloud-cover, etc.
- ✓ Access to **external collections**
- ✓ Standard **OpenSearch** interface
- ✓ Semantic search over multiple data sources using **SPARQL**
- ✓ INSPIRE-compliant

DATA ACCESS

- ✓ Direct access to **uncompressed data products** via file- (NFS) and object (S3 compliant) interfaces
- ✓ Data **ordering** from offline collections (UI&API)
- ✓ **On-demand data processing** (UI&API)
- ✓ **WMS/WMTS** interface to **virtual data cube** (real-time Copernicus data processing)



USER TOOLS

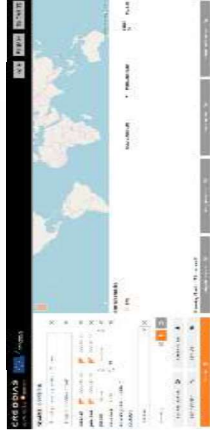
CREODIAS Portal



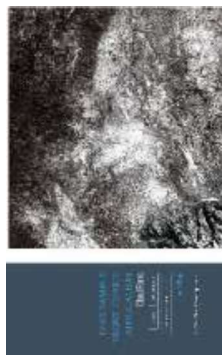
EO Browser



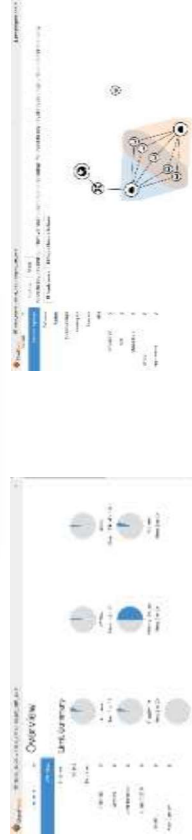
EO Finder



Third party Applications

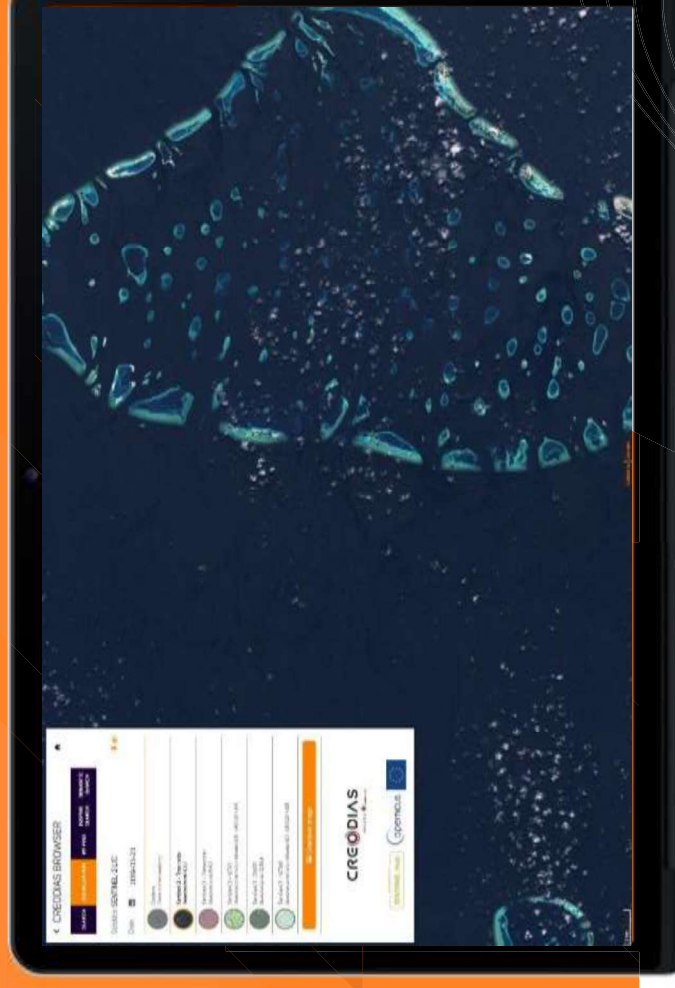


Cloud Dashboard



EO BROWSER

- ✓ Allows visualization, zooming and basic processing of selected data collections
- ✓ The SPARQL interface provides extended search capabilities (semantic search) linking metadata of products stored in the repository with external data sources
- ✓ Tile browsers based on CREODIAS WMTS data can be embedded in third party applications

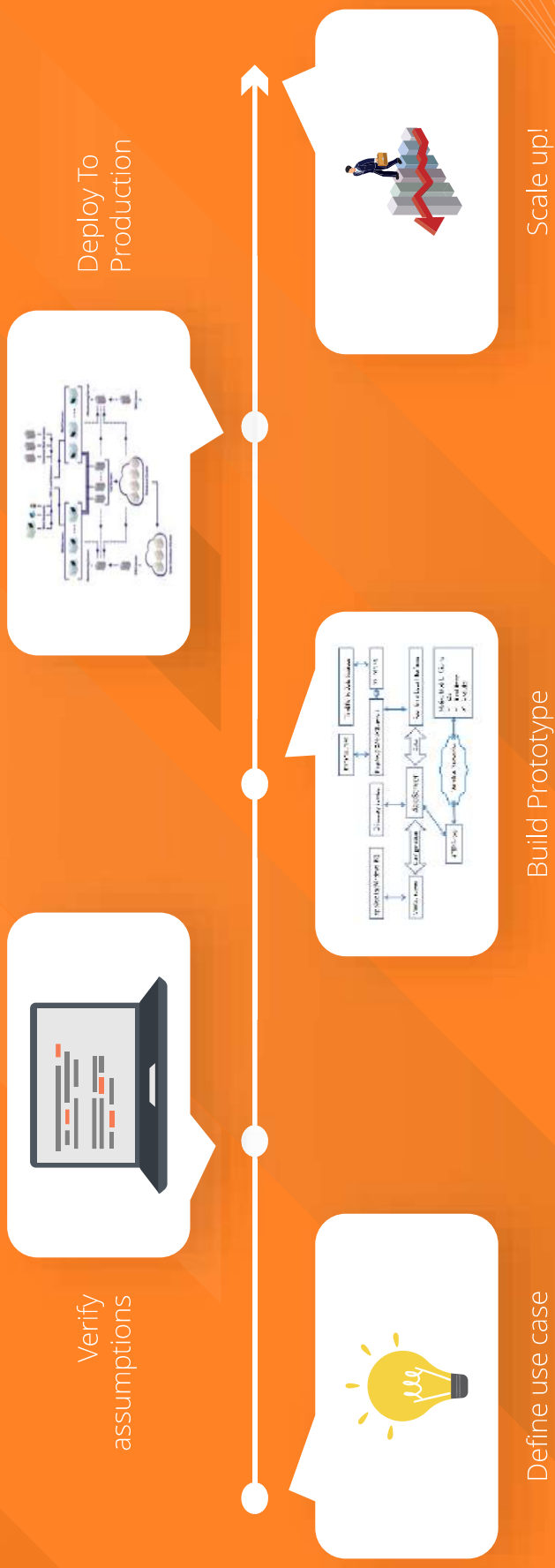


CREODIAS ENVIRONMENT - OPEN AND FLEXIBLE



- 01 All the data at your fingertips - no more downloads
- 02 Industry standard APIs: OGC, OpenStack, S3, SPARQL
- 03 Full flexibility - use any OS, frameworks, tools or processing chains
- 04 Smooth integration of external data
- 05 Fast deployment and easy scaling

EO APPLICATION DEVELOPMENT - GENERAL WORKFLOW



Define use case

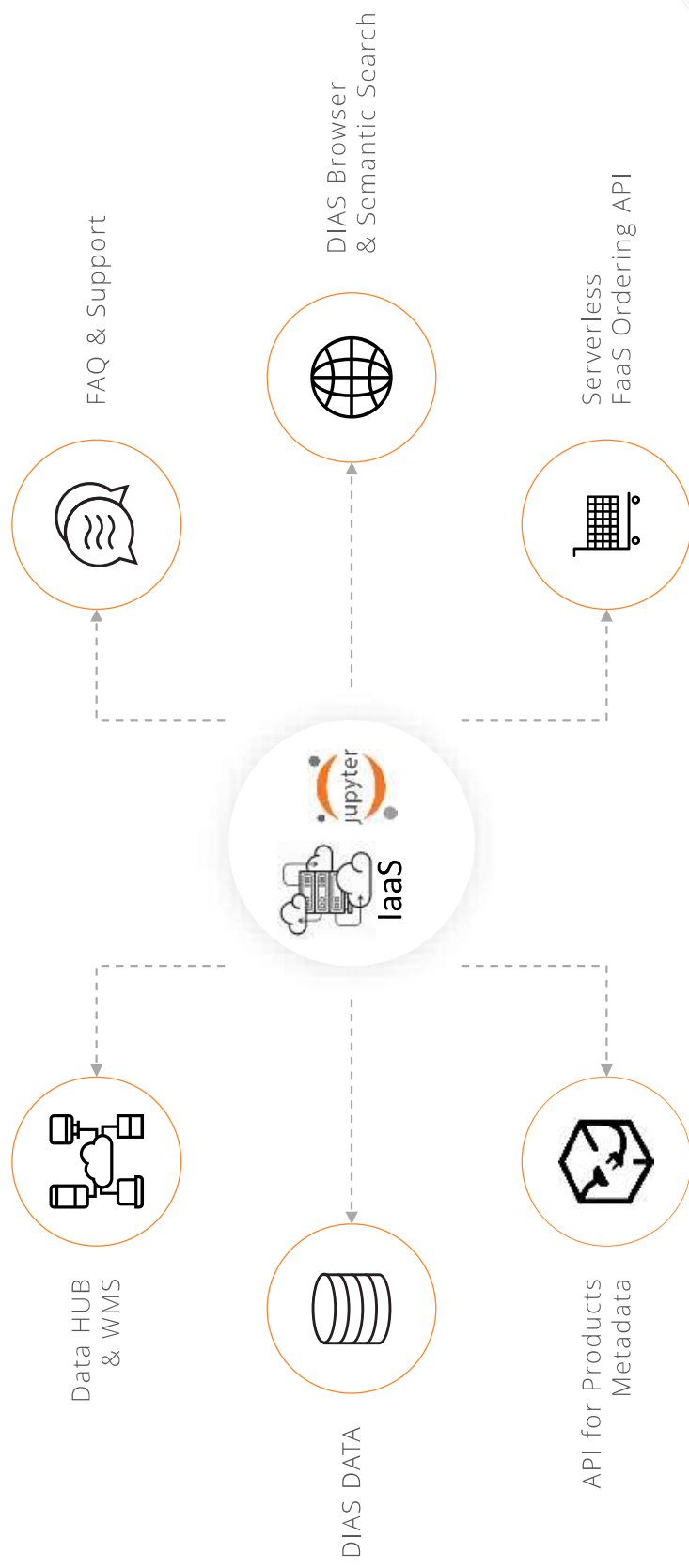
Verify assumptions

Build Prototype

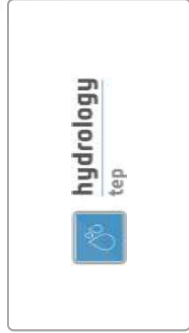
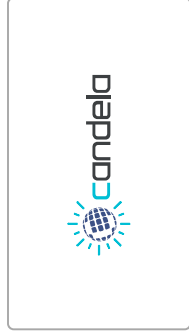
Deploy To Production

Scale up!

DATA PROCESSING ON DIAS



EXAMPLES OF LIVE PROJECTS ON CREODIAS



PROCESSING SAMPLE RUNNING ON CREODIAS – S2GLC



LAND COVER MAP

S2GLC Extension – Europe

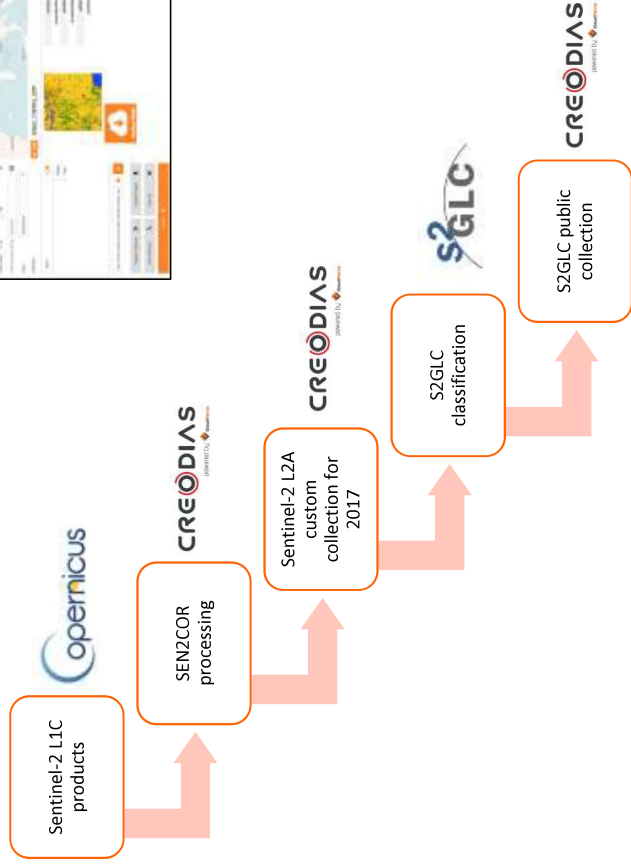
Classification of Sentinel-2 data from year 2017

LEGEND

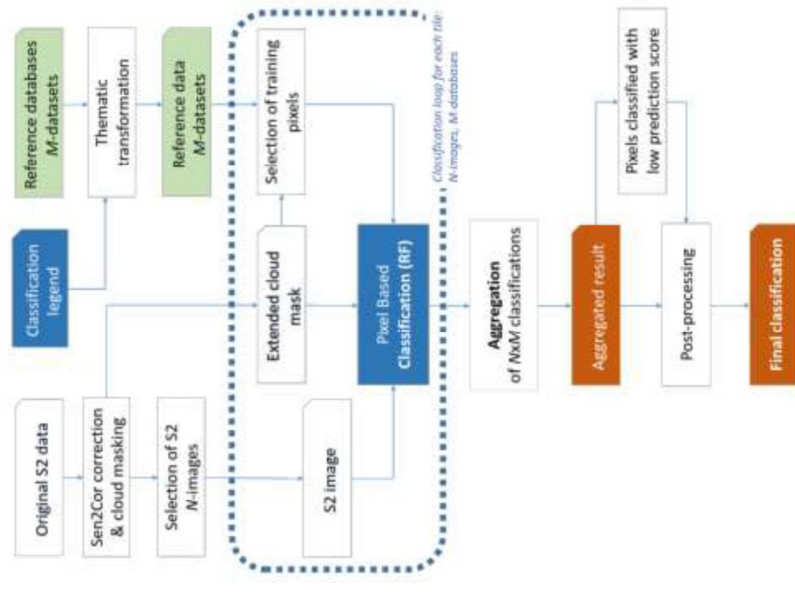
- 5-2 tile
- Clouds
- Artificial surfaces and constructions
- Cultivated areas
- Vineyards
- Broadleaf tree cover
- Coniferous tree cover
- Herbaceous vegetation
- Moors and Heathland
- Sclerophyllous vegetation
- Marshes
- Peatbogs
- Natural material surfaces
- Permanent snow covered surfaces
- Water bodies



PROCESSING SAMPLE RUNNING ON CREODIAS – S2GLC

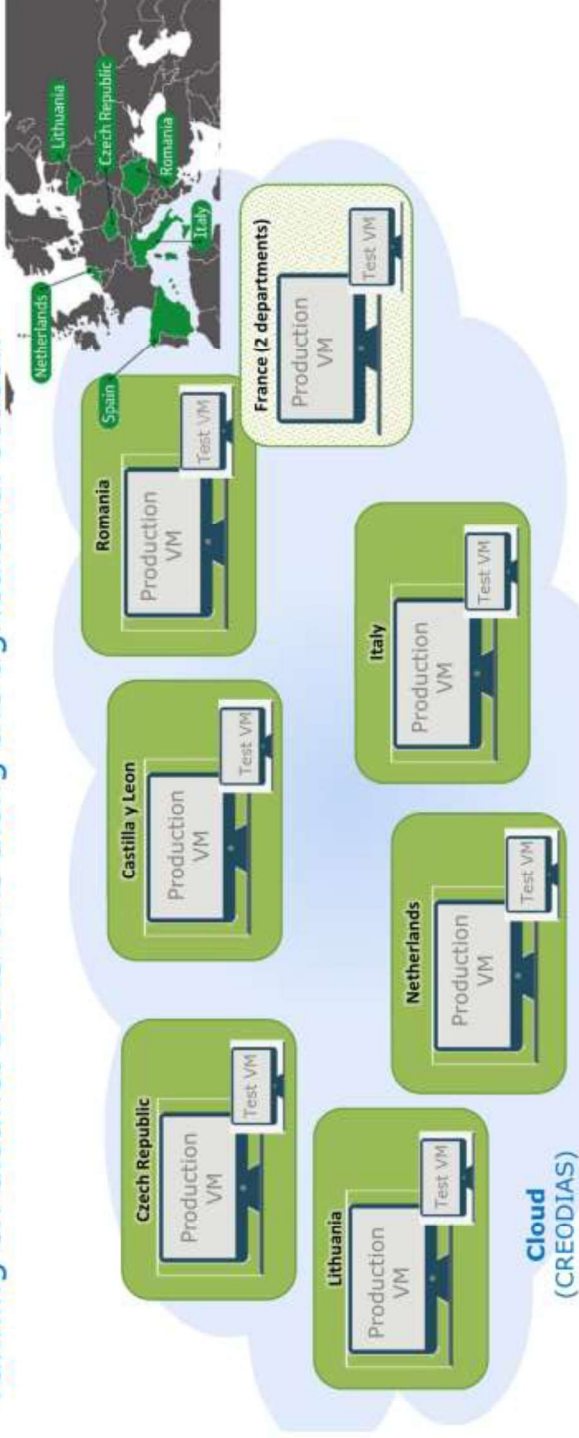


Automated Land Cover Classification



PROCESSING SAMPLE RUNNING ON CREODIAS- Sen4CAP

2019 Sen4CAP processing just started for 6+1 Paying Agencies running on distinct DIAS VMs along the agricultural season



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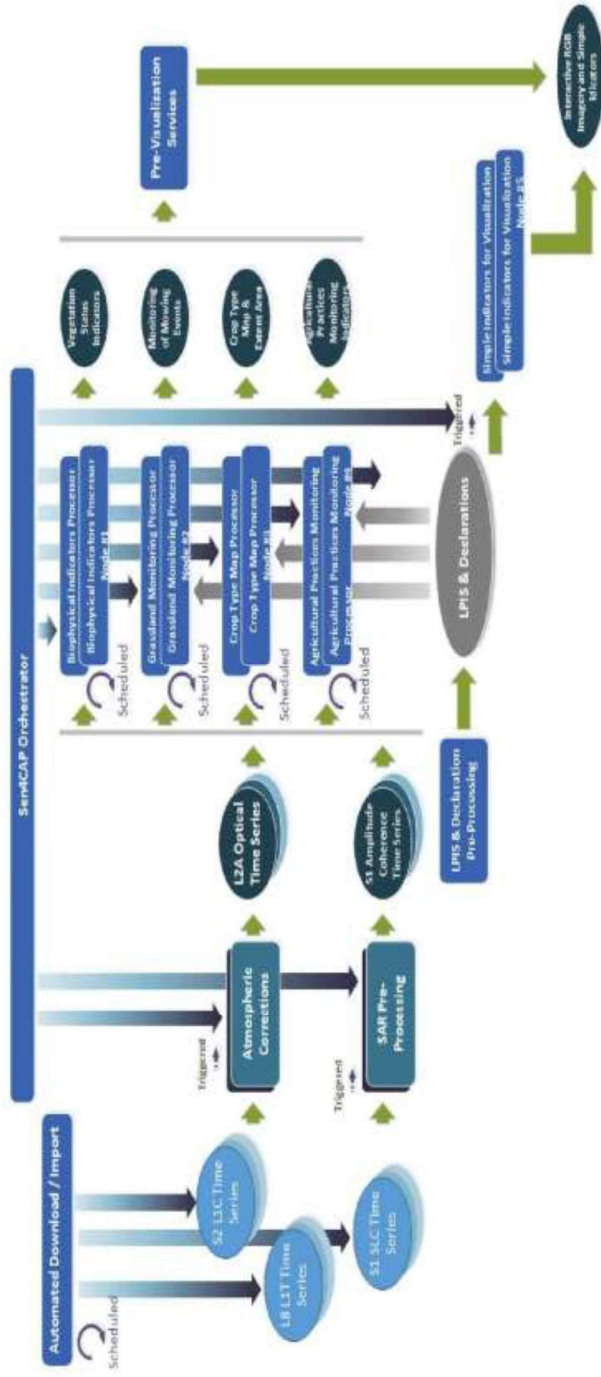
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European Space Agency

PROCESSING SAMPLE RUNNING ON CREODIAS- Sen4CAP

Sen4CAP System overview – open source code

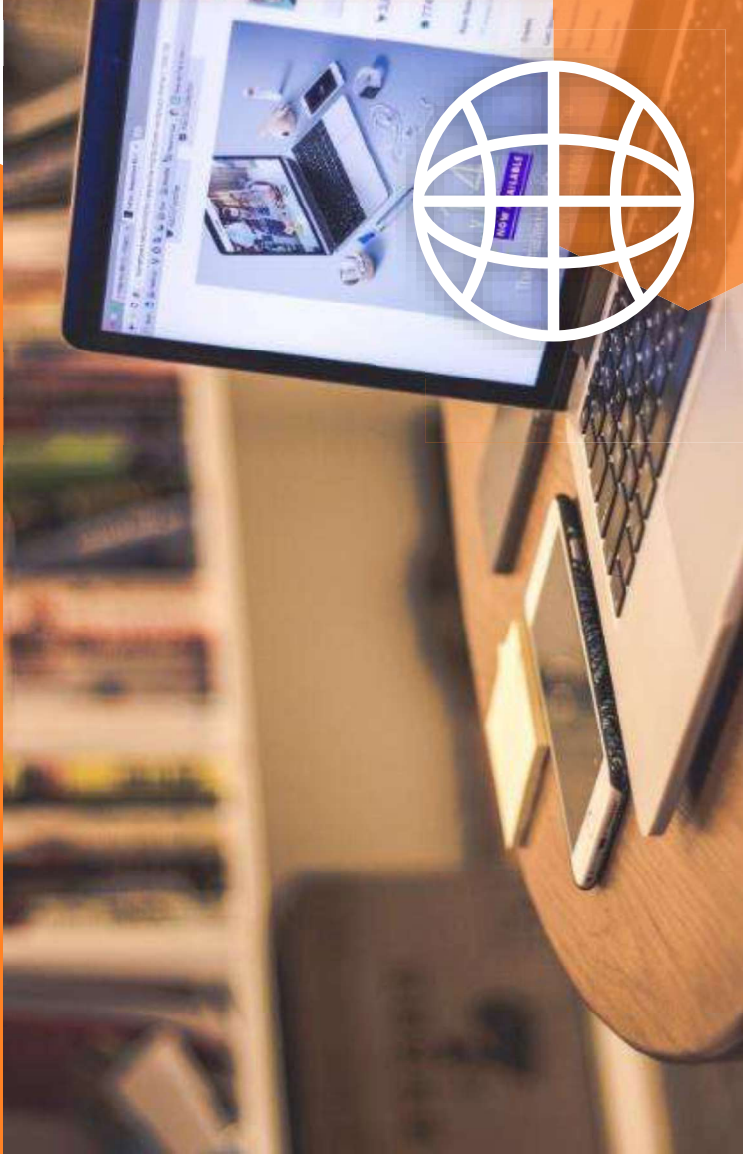


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LINKS TO CREODIAS TOOLS

Portal : <https://portal.creodias.eu>

EO Finder : <https://finder.creodias.eu>

EO Browser : <https://browser.creodias.eu>

EO Catalogue : <https://discovery.creodias.eu>

Jupyter Hub : <https://jupyter.creodias.eu/>

EO Cloud : <https://cf2.cloudferro.com>

THANK YOU FOR YOUR ATTENTION

FOR MORE, PLEASE VISIT :

www.creodias.eu

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