

# DEEP demo

Deep learning in a Cloud and HPC environment

EOSChub week: 18-20.5.2020

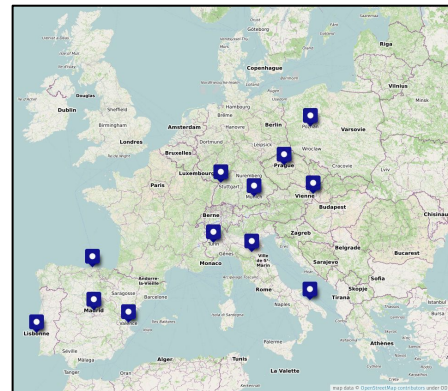
20.5.2020

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On behalf of partners of DEEP

## Designing and Enabling E-Infrastructures for intensive data Processing in a Hybrid DataCloud

- Started as a spin-off project (together with XDC) from INDIGO-DataCloud technologies
- H2020 project, EINFRA-21 call
- Runs **November 1st 2017 – April 2020**
- **9 academic** partners + **1 industrial** partner:  
CSIC, LIP, INFN, PSNC, KIT, UPV, CESNET, IISAS, HMGU; Atos

**Goal:** prepare **a new generation of e-Infrastructures** that harness latest generation technologies, supporting **deep learning** and other **intensive computing** techniques to exploit **very large data** sources



**Global objective:** promote the use of intensive computing services by different research communities and areas, and the support by the corresponding e-Infrastructure providers and open source projects

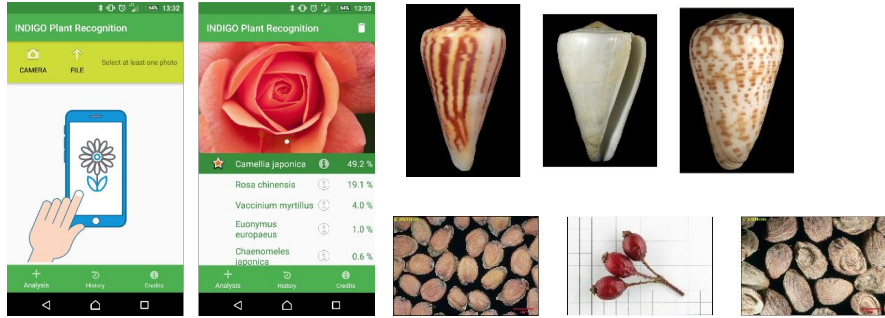
Ease and lower the entry barrier for non-skilled scientists

- Transparent execution on e-Infrastructures
- Build ready to use modules and offer them through a catalog or marketplace
- Implement common software development techniques also for scientist's applications (DevOps)

# Deep Learning Use-cases

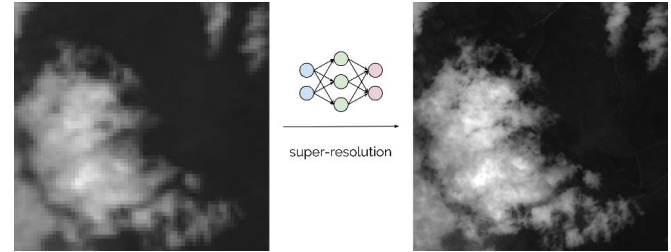
## Image Classification

Plants, Conus marine snails, Seeds, Phytoplankton (CNN, TF)



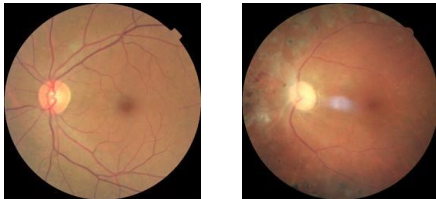
## Satellite Imagery

Super-resolution service (e.g. DSen2; TF)



## Retinopathy

DL to analyze color fundus retinal photography images (CNN, TF)



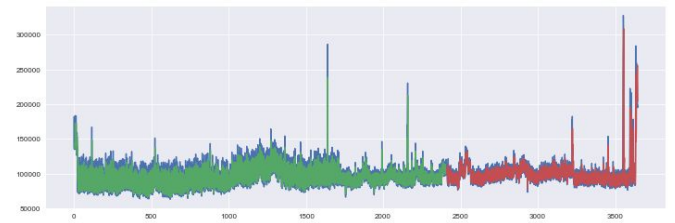
## DEEP Leading Interaction: dog's breed detection

to test the infrastructure and provide working examples



## Massive Online Data Streams: Online analysis of data streams

Intrusion detection systems (LSTM/GRU, TF)



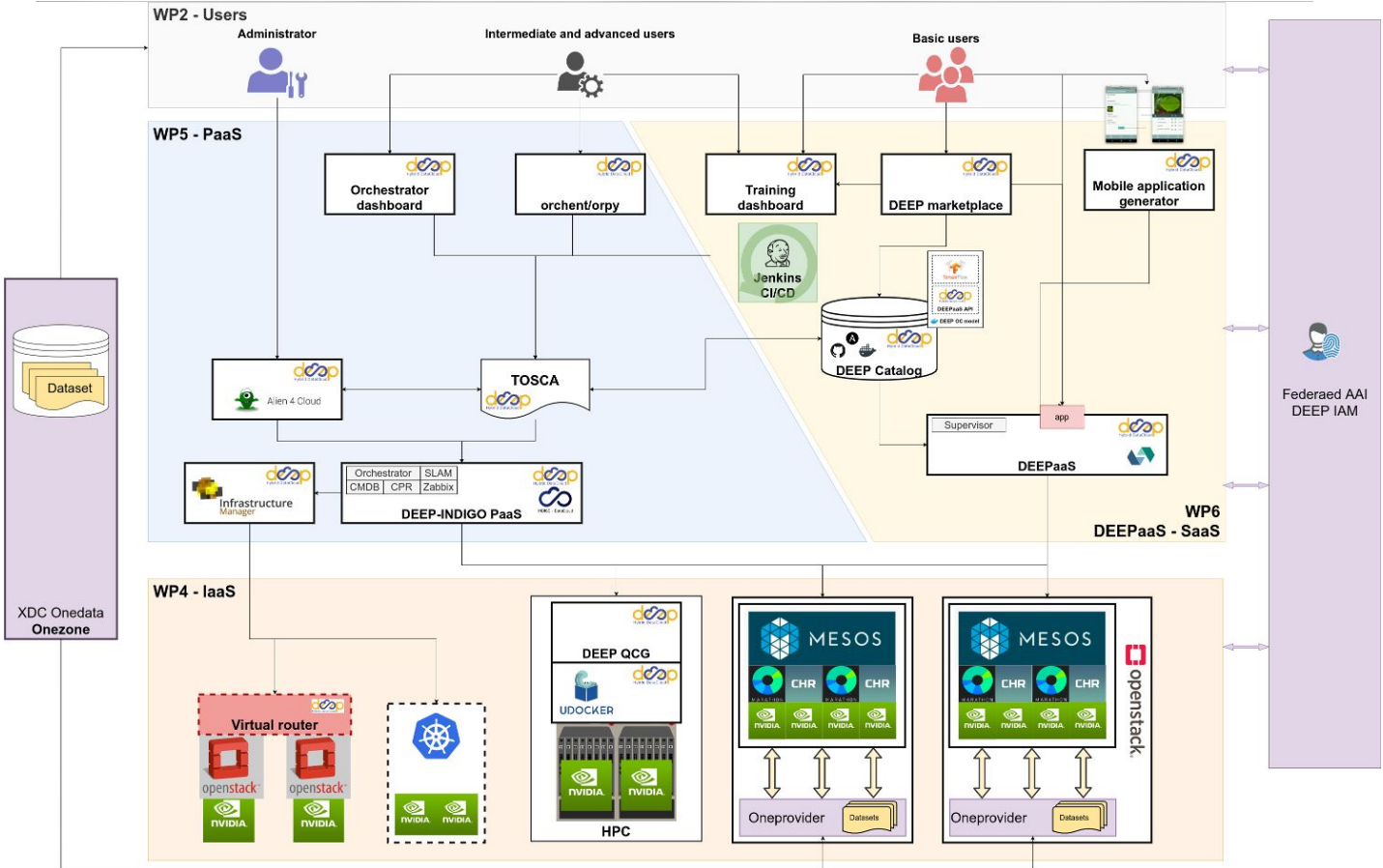
dataset, prediction (train), prediction (test)

# Many more leveraging the framework

- Genetic studies
- X-ray images classification
- Data science to understand confinement effectiveness
- Conus classification
- Phytoplankton classification
- Seed classification
- Photonics
- Bacterial Taxonomy Classification
- Conex Generator
- Statistical Downscaling
- Semseg Vaihingen
- Nutrient estimation through surrogate variables
- Image classification
- Body pose detection
- Audio classification
- Bird sound classification
- Speech keyword classification
- Object Detection and Classification
- Artistic style transfer

Please, explore most of them in <https://marketplace.deep-hybrid-datacloud.eu/>

# DEEP architecture



# In our demo #1 : Cloud

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- How to explore the **DEEP Open Catalog** (<https://marketplace.deep-hybrid-datacloud.eu/> )
- How to deploy a **DEEP Development Environment** (based on JupyterLab) in the **DEEP Cloud Testbed** (with GPU) via PaaS Orchestrator **Dashboard**
- How to use one of our modules for **training** in the Cloud with your own data:
  - Access the module, trigger training, monitor training
- How to use one of our pre-trained modules for **inference**
- All the steps above **can also be locally deployed and run**

# In our demo #2.1 : HPC

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- How to login to HPC system via **PAM SSH** using **oidc token**
- How to deploy a **DEEP Development Environment** in HPC from the command line (by means of **udocker** and submitting it as SLURM job)
- How to access the deployment **from your local computer**
- We copy one of the DEEP deep learning modules inside the container and run it for inference

# In our demo #2.2 : HPC

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- How to deploy a Retinopathy deep learning application in HPC via the PaaS Orchestrator **Dashboard** (QCG plugin is used)
- How to leverage **Onedata** storage to access data from the deployment
- We show that the submitted via the Dashboard application **correctly deployed in the HPC system**

# DEEP important links

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- [1] DEEP Hybrid-DataCloud project, <https://deep-hybrid-datacloud.eu/>
- [2] DEEP Marketplace, <https://marketplace.deep-hybrid-datacloud.eu/>
- [3] DEEPaaS Training facility <https://marketplace.eosc-portal.eu/services/deepaas-training-facility>
- [4] DEEP documentation, <https://docs.deep-hybrid-datacloud.eu/en/latest/user/>
- [5] Udocker tool, <https://github.com/indigo-dc/udocker>

# Thank you

DEEP Project: <https://deep-hybrid-datacloud.eu>  
DEEP Open Catalog: <https://marketplace.deep-hybrid-datacloud.eu>  
More docs: <https://docs.deep-hybrid-datacloud.eu>



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