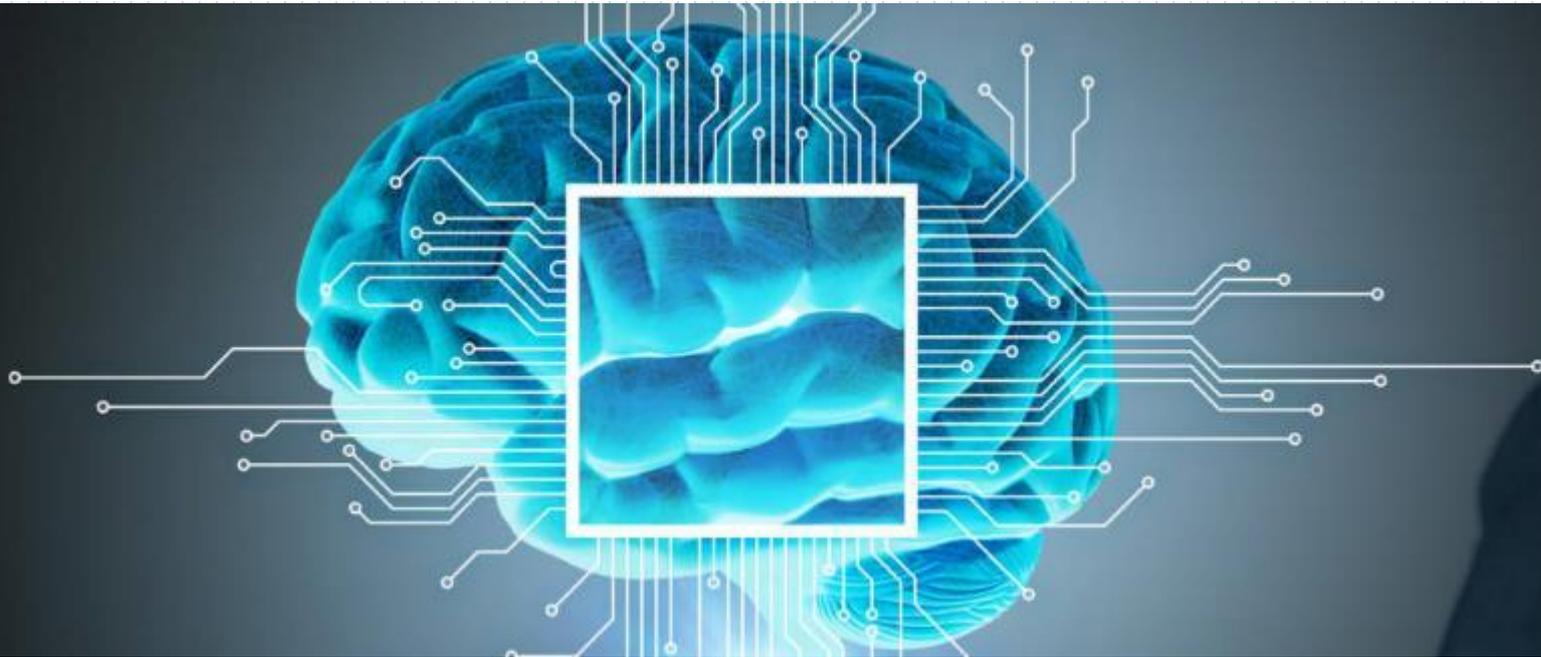


# DEEP as a Service



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# DEEP in 1 slide

Designing and **E**nabling **E**-Infrastructures for intensive data **P**rocessing in a **Hybrid ataCloud**  
(Grant agreement number 777435, Nov 2017 – Apr 2020)

**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

- Focusing on **Machine learning, Deep learning, and Post processing** services for the European Open Science Cloud



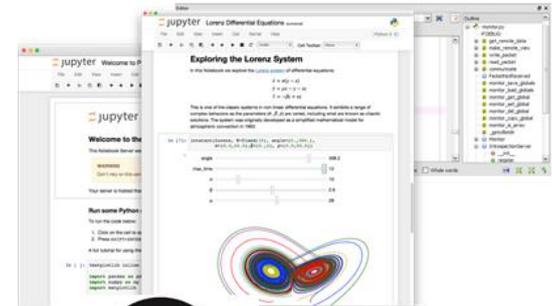
More details: <https://indico.egi.eu/event/5000/contributions/14332/>

# Development cycle in Machine Learning

- The **development of a model starts on a PC**
- The **model is trained** with training data (labelled or not) **and tested** with a different data set
- This phase requires an **adequate computing infrastructure**
- The **model is evaluated** with data that you have never seen before.
- The **cycle is repeated** until the evaluation is satisfactory
- The **work is published** (academy): architecture, data configuration, scientific article, etc.
- Or it is **deployed in production** (industry)

## Open issues:

- Access to infrastructure?
- How to share and exchange knowledge?
- Is there a standard way to deploy it as a production service?
- Good practices?
- And many more ...



# The goal: Deep as a Service

**Training a Machine Learning/Deep Learning model is a very complex and computationally intensive task** requiring the user to have a full setup involving a certain **hardware, the adequate drivers, dedicated software and enough memory and storage resources.**

The DEEP-HybridDataCloud project offers a **framework for all users**, and not just for a few experts, enabling the transparent training, sharing and serving of Deep Learning models both locally or on hybrid cloud system.

**Covers all the phases** of a Machine Learning/Deep Learning project life cycle:

- Development or update of a model → DEEP Open Catalog
- Model training, test and evaluation → DEEP training center
- Model deployment as a service → DEEP as a Service
- Model publication for sharing and reusing → DEEP Open Catalog



The **DEEP Open Catalog** provides the universal point of entry to all services offered by DEEP

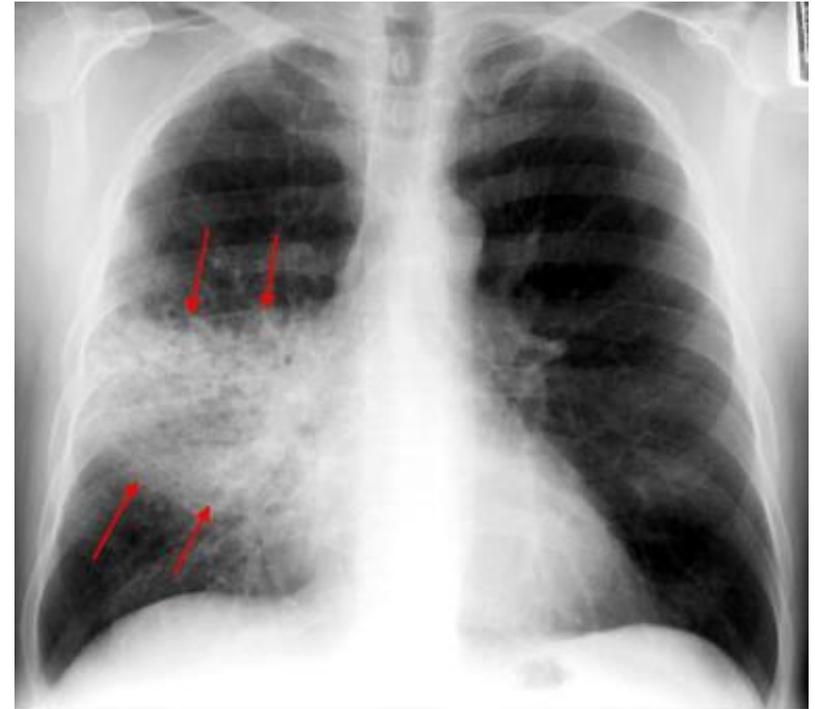
<https://marketplace.deep-hybrid-datacloud.eu>

It offers several options for users of all levels to get acquainted with DEEP

- **Basic Users** can browse the DEEP Open Catalog, download a certain model and apply it to some local or remote data for inference/prediction.
  - **Intermediate Users** can also browse the DEEP Open Catalog, download a model and do some training using their own data easily changing the parameters of the training.
  - **Advanced Users** can do all of the above. In addition, they will work on more complex tasks, that include larger amounts of data.
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# The demo

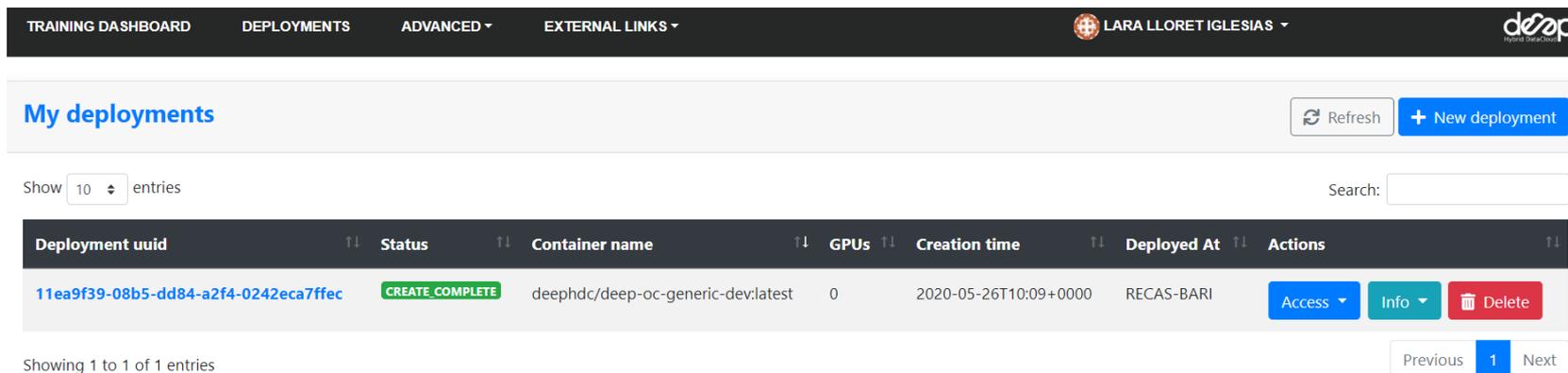
- When the COVID-19 emergency started we were contacted by the **Marqués de Valdecilla Hospital**
- They were interested in a Deep Learning **image classifier for chest X-Ray images** (pneumonia or non pathological)
- DEEP already had an image classifier in the MarketPlace: **Not adapted for the medical images format (DICOM)**



This demo is based on a real example on how to **adapt an existing DEEP module** for other task, **train** it, **deploy** it as a service and **share** it in the Market place

# What you can see in this demo

- We will introduce the **DEEP training dashboard** and will deploy the **development module**



The screenshot shows the DEEP training dashboard interface. At the top, there is a navigation bar with links for TRAINING DASHBOARD, DEPLOYMENTS, ADVANCED, and EXTERNAL LINKS. The user is identified as LARA LLORET IGLESIAS. The main section is titled "My deployments" and includes a "Refresh" button and a "+ New deployment" button. Below this, there is a search bar and a table of deployments. The table has columns for Deployment uuid, Status, Container name, GPUs, Creation time, Deployed At, and Actions. One deployment is listed with the uuid 11ea9f39-08b5-dd84-a2f4-0242eca7fec, a status of CREATE\_COMPLETE, and a container name of deepcdc/deep-oc-generic-dev:latest. The Actions column for this deployment contains buttons for Access, Info, and Delete. At the bottom, it shows "Showing 1 to 1 of 1 entries" and a pagination control with "Previous", "1", and "Next" buttons.

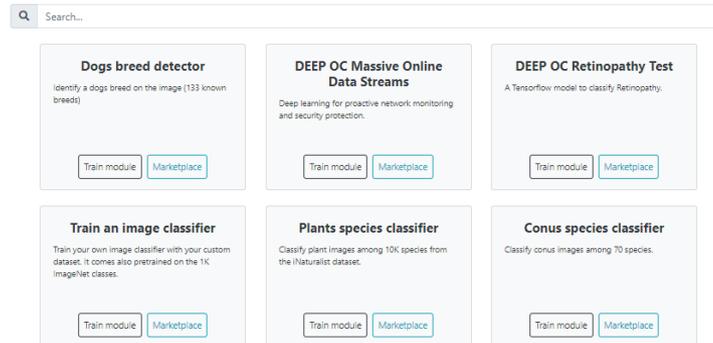
| Deployment uuid                     | Status          | Container name                     | GPUs | Creation time         | Deployed At | Actions            |
|-------------------------------------|-----------------|------------------------------------|------|-----------------------|-------------|--------------------|
| 11ea9f39-08b5-dd84-a2f4-0242eca7fec | CREATE_COMPLETE | deepcdc/deep-oc-generic-dev:latest | 0    | 2020-05-26T10:09+0000 | RECAS-BARI  | Access Info Delete |

- The data (chest x-ray DICOM images) are stored in **OneData**
- We will clone the **adapted repository on image classification** from GitHub and use it for **training with the medical images** → Transfer Learning

# What you can see in this demo

- When the new module is trained we want to **include it in the DEEP Marketplace**
- As soon as we commit the code to GitHub the **Jenkins pipeline is triggered** starting the different **software quality tests**
- When the **Jenkins pipeline is finished**, the module will be available as service the **DEEP Marketplace** and can be used as a service to predict on new images

## Explore the Marketplace



Search...

|  |   |  |
|--|---|--|
| <b>Dogs breed detector</b><br>Identify a dog's breed on the image (133 known breeds)   | <b>DEEP OC Massive Online Data Streams</b><br>Deep learning for proactive network monitoring and security protection. | <b>DEEP OC Retinopathy Test</b><br>A Tensorflow model to classify Retinopathy. |
| <b>Train an image classifier</b><br>Train your own image classifier with your custom dataset. It comes also pretrained on the 1K imageNet classes. | <b>Plants species classifier</b><br>Classify plant images among 10K species from the iNaturalist dataset.             | <b>Conus species classifier</b><br>Classify conus images among 70 species.     |

# In summary

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- Demo video is available here: <https://tinyurl.com/yyuznjdw>
  - We have **taken a module** from the DEEP market place and **adapted it** to perform a new task
  - We have used this new module to **train on a new dataset** and we have **integrated the trained model into the DEEP Market Place**
  - Now, the **module is available as a service** so that anybody can use our training model to **perform some prediction**
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# Thank you!



<https://deep-hybrid-datacloud.eu>



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