

# DEEP as a Service



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# DEEP in 1 slide

Designing and **Enabling 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



**HelmholtzZentrum münchen**  
Deutsches Forschungszentrum für Gesundheit und Umwelt



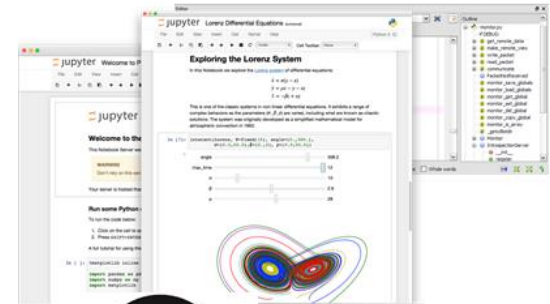
More details: <https://indico.egi.eu/event/5000/contributions/14332/>

# 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

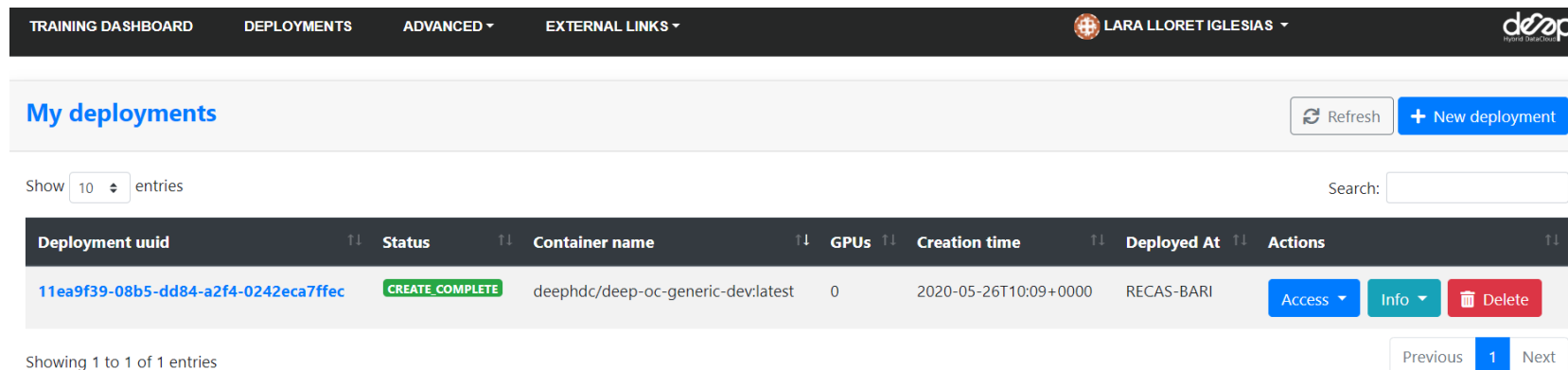
- When the COVID-19 emergency started we were contacted by the **Marqués de Valdecilla Hospital**
- They were interested in a Deep Learning **image classifier for chest X-Ray images** (pneumonia or non pathological)
- DEEP already had an image classifier in the MarketPlace: **Not adapted for the medical 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 tabs for 'TRAINING DASHBOARD', 'DEPLOYMENTS', 'ADVANCED', and 'EXTERNAL LINKS'. The user 'LARA LLORET IGLESIAS' is logged in. Below the navigation bar, the 'My deployments' section is visible, featuring a 'Refresh' button and a '+ New deployment' button. A search bar is also present. The main content is a table with the following columns: 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 table also shows 0 GPUs, a creation time of '2020-05-26T10:09+0000', and a deployment location of 'RECAS-BARI'. The Actions column contains 'Access', 'Info', and 'Delete' buttons. At the bottom, it indicates 'Showing 1 to 1 of 1 entries' and includes 'Previous', '1', and 'Next' navigation buttons.

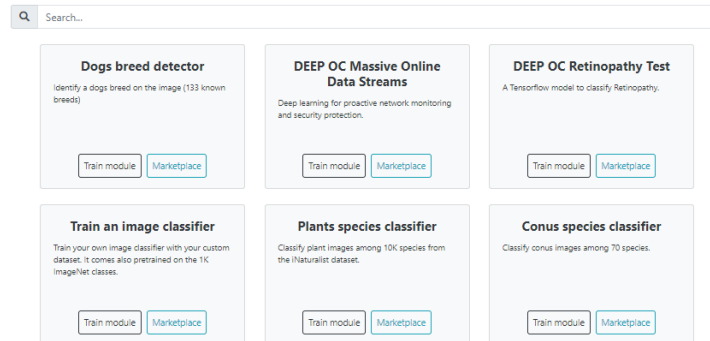
Deployment uuid	Status	Container name	GPUs	Creation time	Deployed At	Actions
11ea9f39-08b5-dd84-a2f4-0242eca7fec	CREATE_COMPLETE	deepcdc/deep-oc-generic-dev:latest	0	2020-05-26T10:09+0000	RECAS-BARI	Access Info Delete

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



- 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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