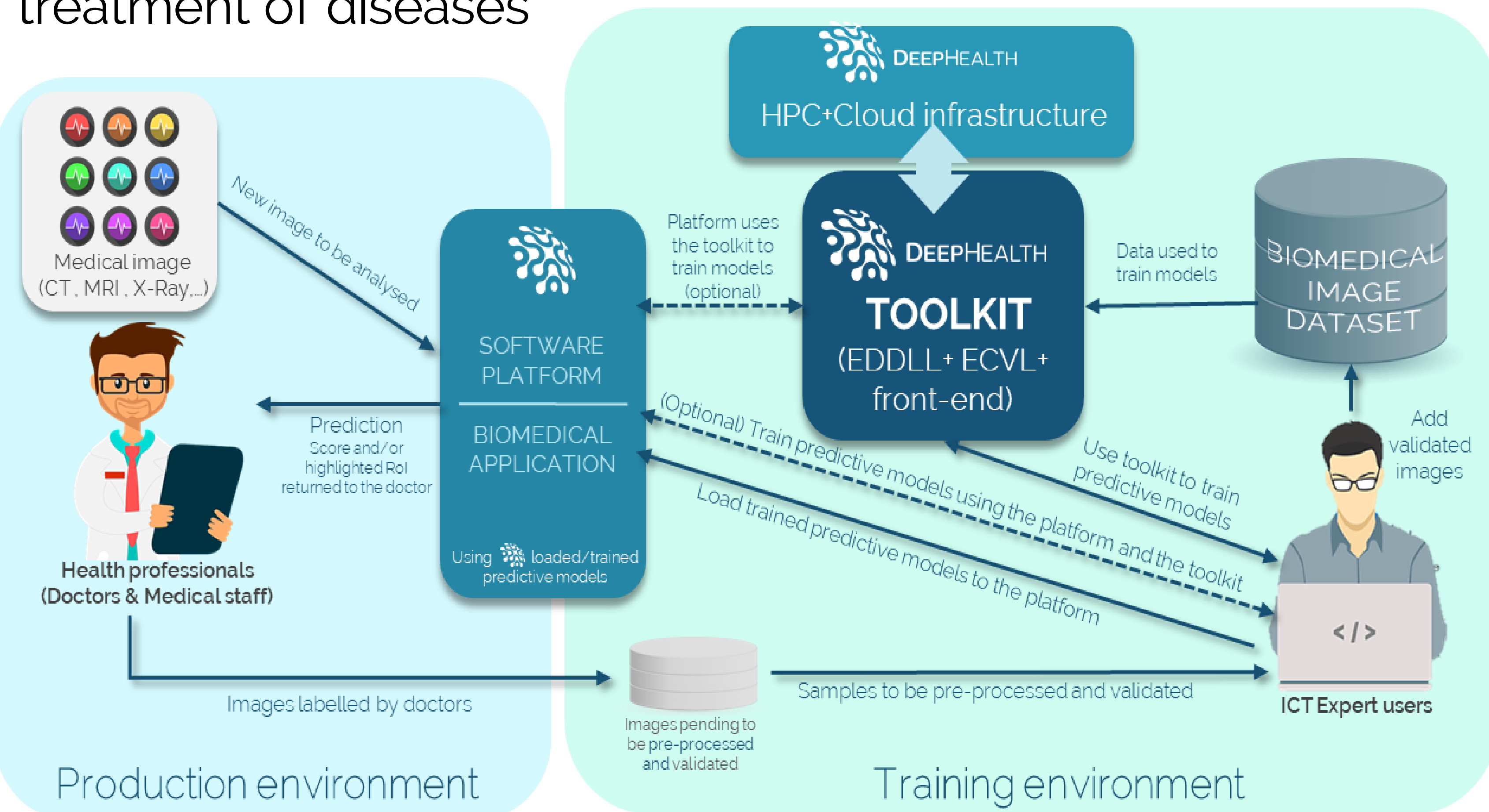


## Aim

Provide **High Performance Computing (HPC)** power at the service of biomedical applications; and apply **Deep Learning (DL)** and **Computer Vision (CV)** techniques on large and complex biomedical datasets to support new and more efficient ways of diagnosis, monitoring and treatment of diseases



## Objectives

### AI PERSPECTIVE

- Increase the productivity of IT professionals in terms of training image-based predictive models without the need of combining numerous tools.

### AI + HPC PERSPECTIVE

- Offer a unified framework adapted to exploit underlying heterogeneous HPC and cloud infrastructures for supporting state-of-the-art and next-generation DL (AI) and CV algorithms

### REACHING THE INDUSTRY AND SOCIETY

- Work towards reducing the gap between the availability of cutting-edge technologies and its extensive use for medical imaging - enhance European-based medical software platforms.

## Development & Results

**The DeepHealth toolkit:** Open Source libraries to leverage HPC/Cloud infrastructures to train AI/ML models using distributing computing. (+ back-end & front-end)

**EDDLL:** The European Distributed Deep Learning Library  
**ECVL:** the European Computer Vision Library

**HPC infrastructure support** for an efficient execution of the libraries, making use of heterogeneous hardware in a transparent way (usability) and promoting portability. .

**Integration of DeepHealth libraries into seven biomedical and AI software platforms** to improve their potential (end-users: clinical and health data scientists)

Validation in 14 use cases (training DL models, inference)

## Use Cases - 14 pilot test-beds in 3 areas:

### Neurological diseases

- Migraine and Seizures prediction
- Major Depression
- Dementia
- Study of structural changes in lumbar spine pathology
- Population model for Alzheimer's Disease
- Epileptic seizures detection
- Objective fatigue assessment for multiple sclerosis patients

### Tumor detection and early cancer prediction

- Chest cancer detection
- Prostate tumor diagnosis
- Skin cancer melanoma detection

### Digital pathology and automated image annotation

- Classification of whole-slide histological images of colorectal biopsy samples
- CT brain perfusion maps synthesis
- Deep Image annotation
- Image Analysis and prediction for Urology

## Expected Impact

For IT experts:

- Increase the productivity of IT staff working in the health sector by allowing them to design, train and test many more predictive models in the same period of time
- Facilitate IT experts work ease use/train of Deep Neural Networks on HPC with no profound knowledge on Deep Learning, HPC, distributed or cloud computing.

Health impact:

- Increase early diagnosis and improving treatments
- Extend the knowledge about diseases and pathologies
- Save direct and indirect healthcare costs

Beyond Health  
Contributing to increase AI impact on the society

- Applicable to other sectors and applications
- Turn AI + HPC as an enabling technology for Science
- Eases adoption by the industry, following the trend AI+HPC as a service for increasing number of applications
- Other DL-based applications & Graph-based applications

## Partners

### Research organizations



### Health organizations



### Large industries



### SMEs



## Key facts

STARTING  
January 2019

DURATION  
42 MONTHS

BUDGET  
€ 14m

## Contact and more information

**Project Coordinator:** Mónica Caballero  
[monica.caballero.galeote@nttdata.com](mailto:monica.caballero.galeote@nttdata.com)

**Technical Manager:** Jon Ander Gómez  
[jon@upv.es](mailto:jon@upv.es)

<https://deephealth-project.eu>



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