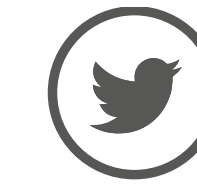




# eFlows4HPC

Enabling dynamic and Intelligent workflows  
in the future EuroHPC ecosystem

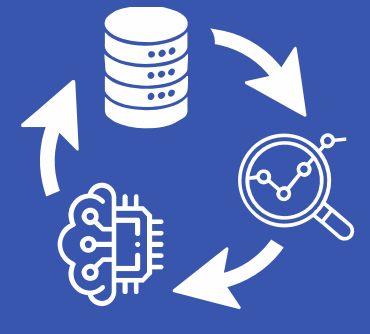
[www.eFlows4HPC.eu](http://www.eFlows4HPC.eu)



@eFlows4HPC



eFlows4HPC Project



Creating a **European workflow platform** to enable the design of complex applications that integrate HPC processes, data analytics and artificial intelligence

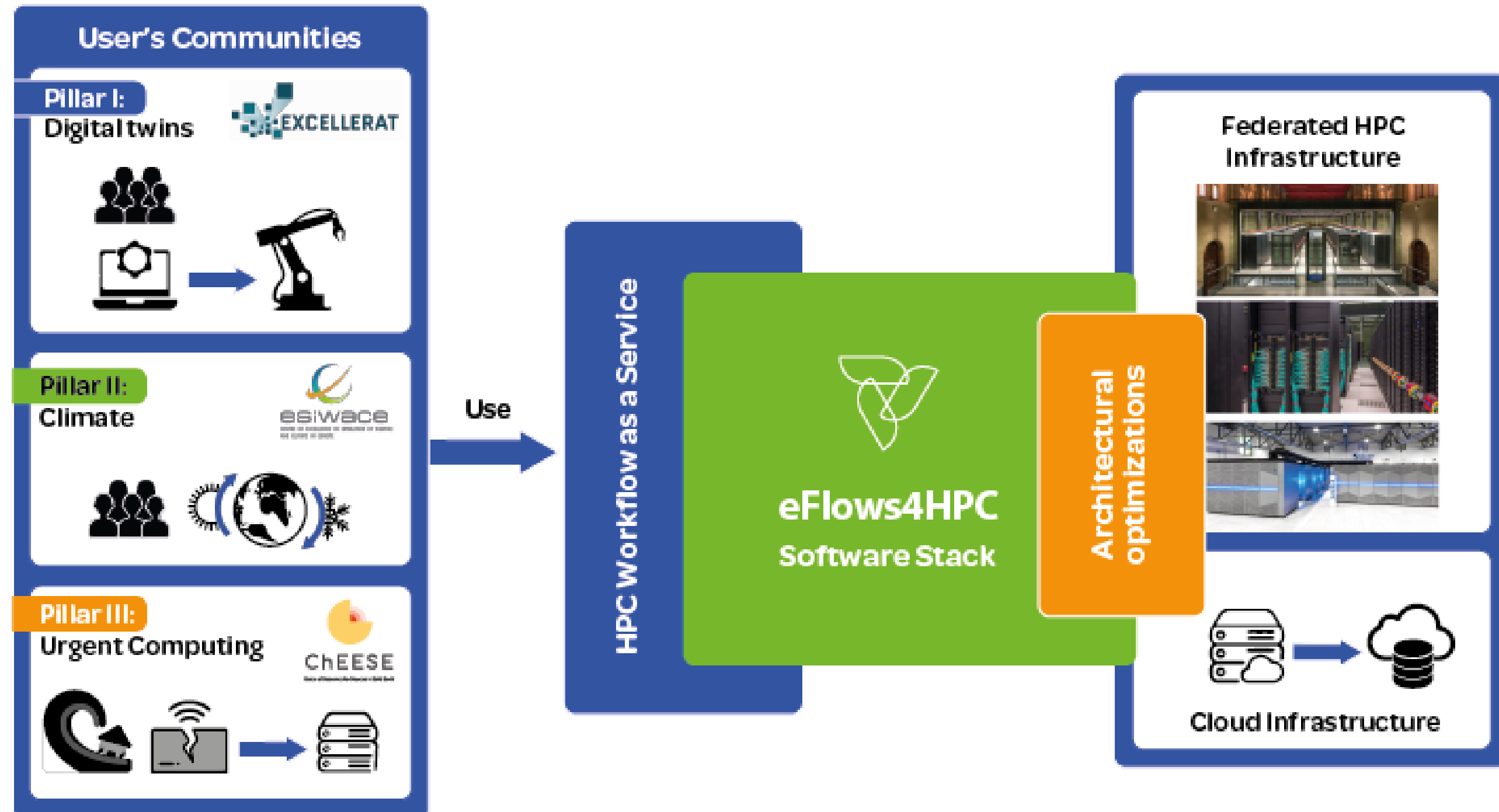


Developing **methodologies** to widen the access to HPC to selected user communities

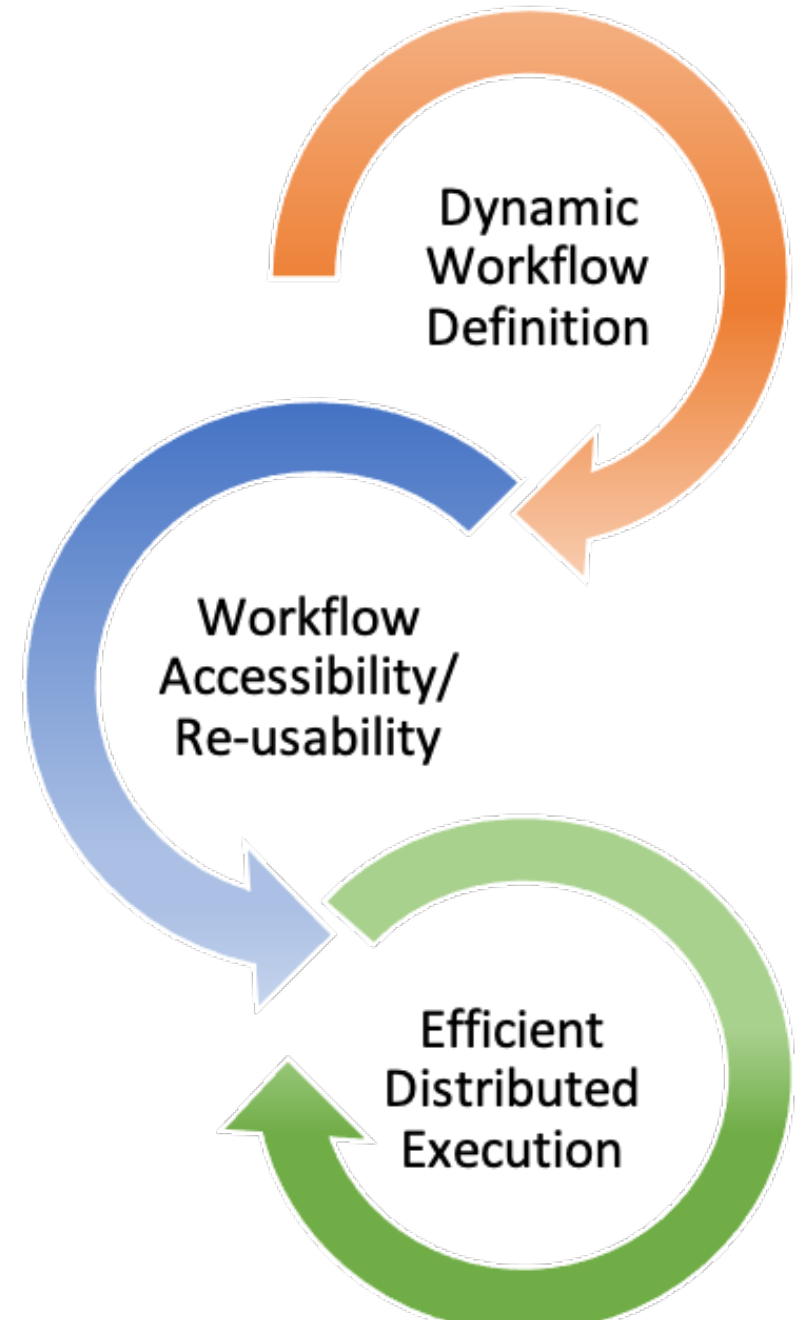
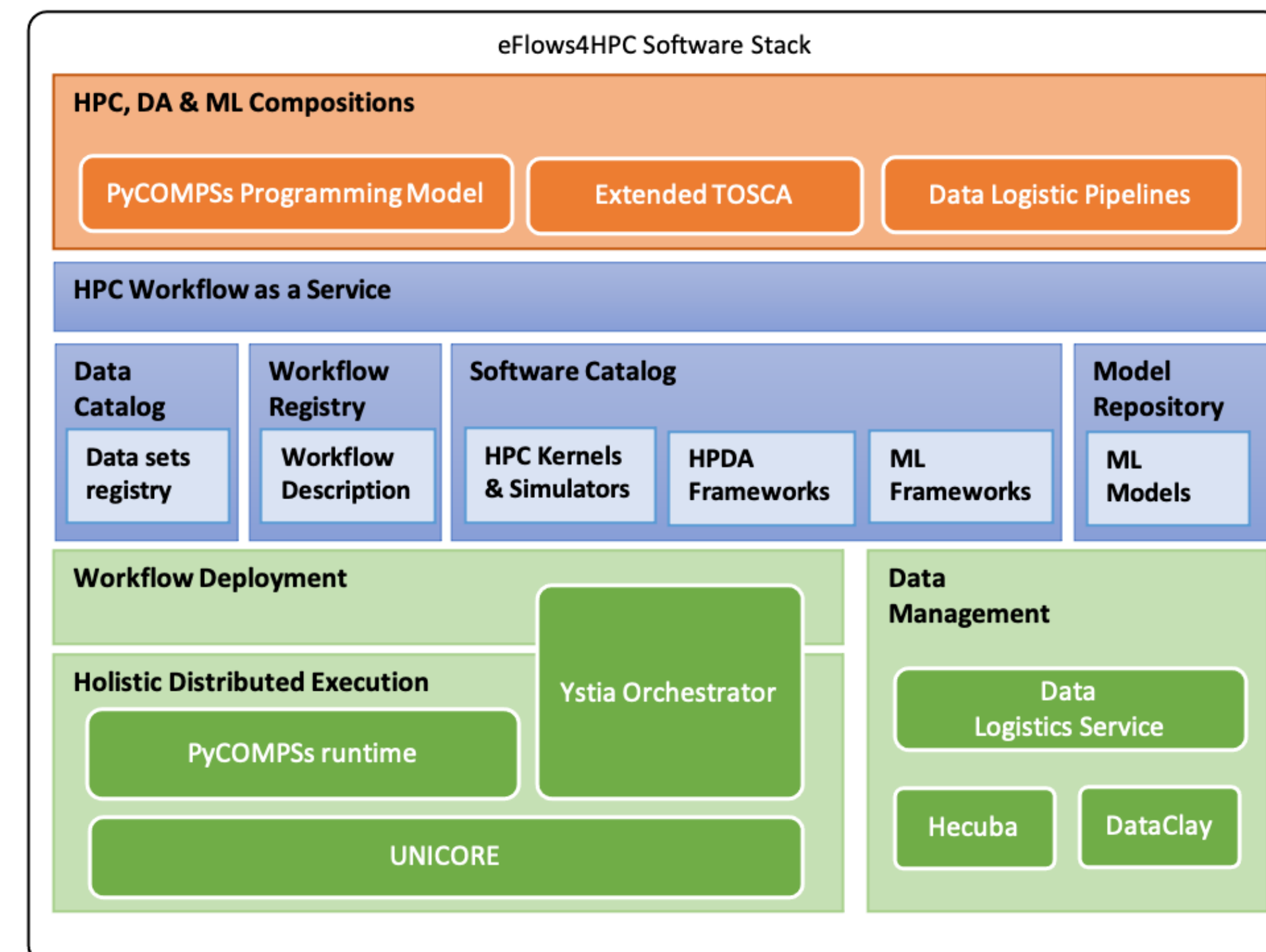


Demonstrating new workflow technologies through manufacturing, climate and urgent computing for natural hazards **use cases**

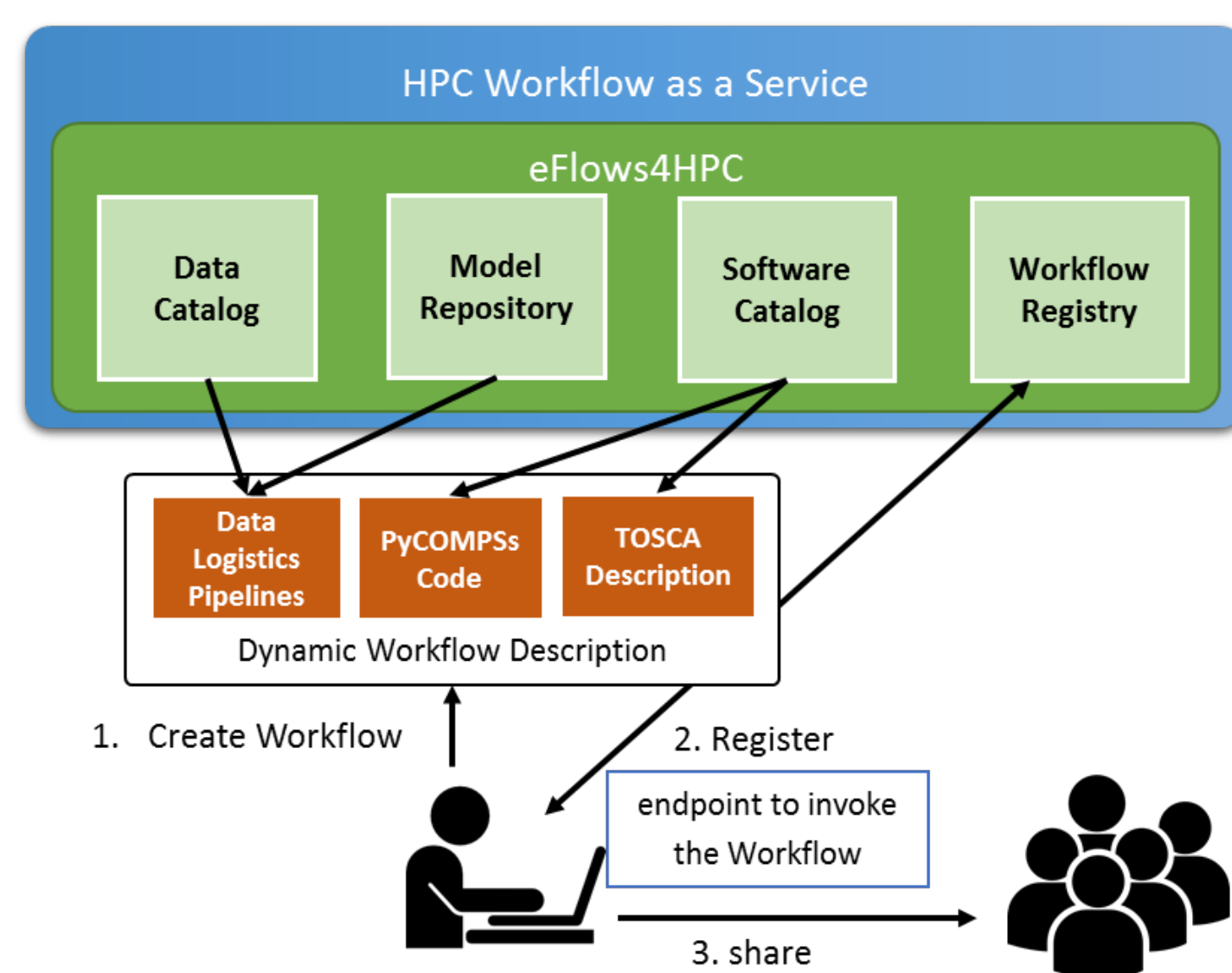
## Overview



## Software Stack



## HPC Workflow as a Service (HPCWaaS)



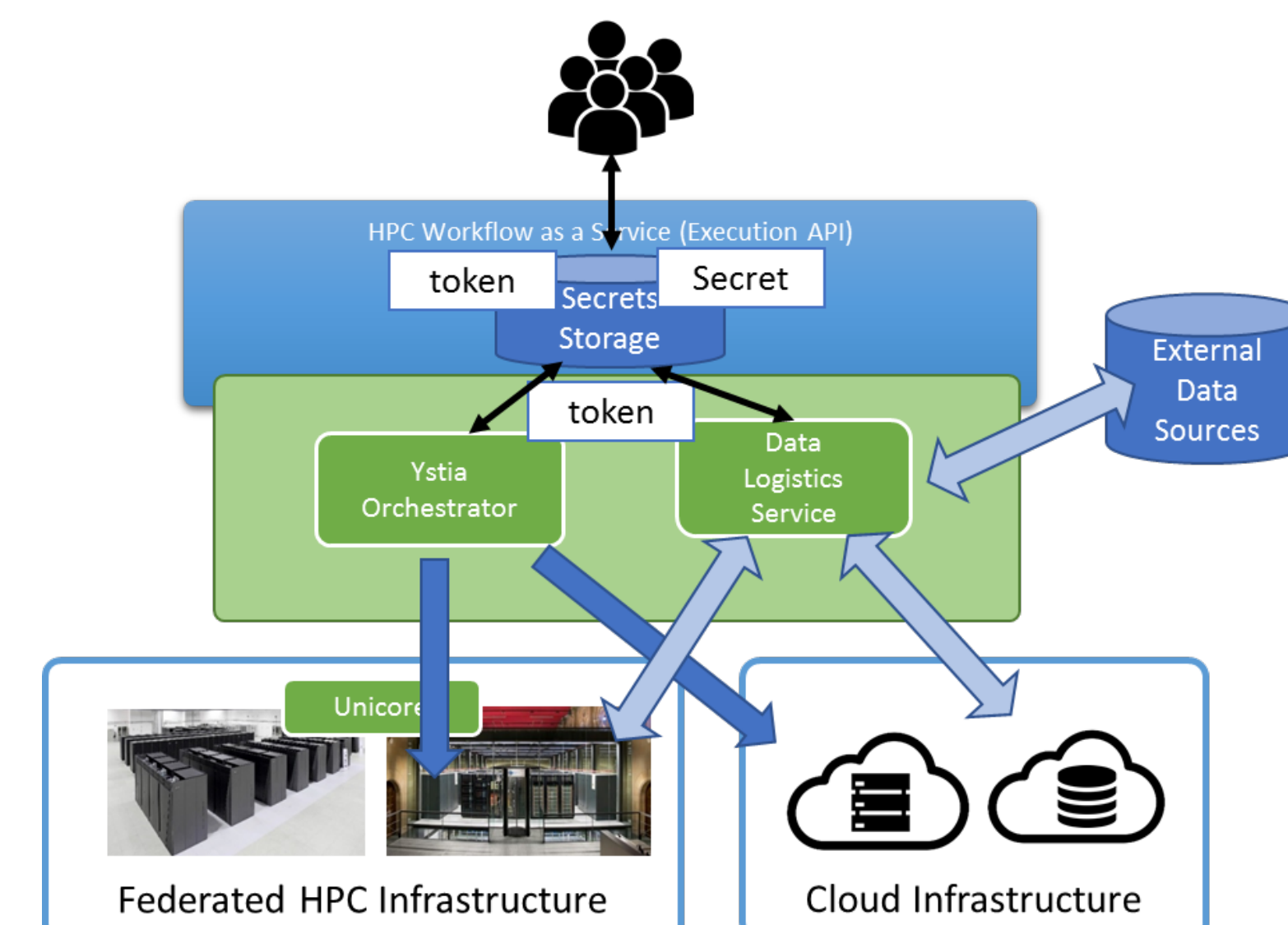
### Development phase

Different catalogues, repositories and registries will be source for workflow components

#### Workflow description:

- TOSCA description:
  - Required software and services
  - Deployment and configuration
- PyCOMPSs:
  - Logic of the dynamic workflow
- Data logistics pipelines:
  - Data movements and storage

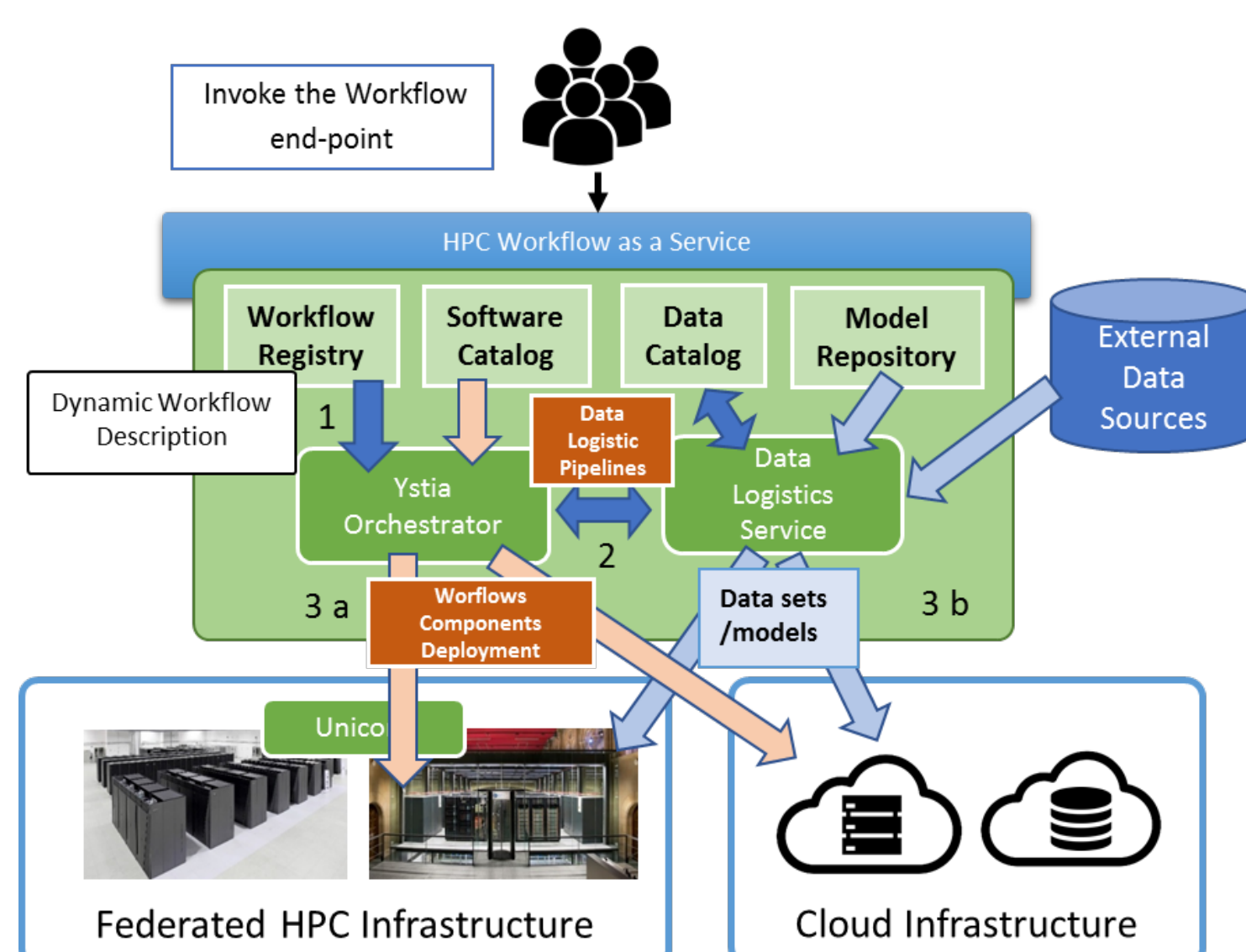
Workflow description in workflow registry with the HPCWaaS interface



### Credential management

Prior to executing the registered workflows, the users have to configure the infrastructure access credentials.

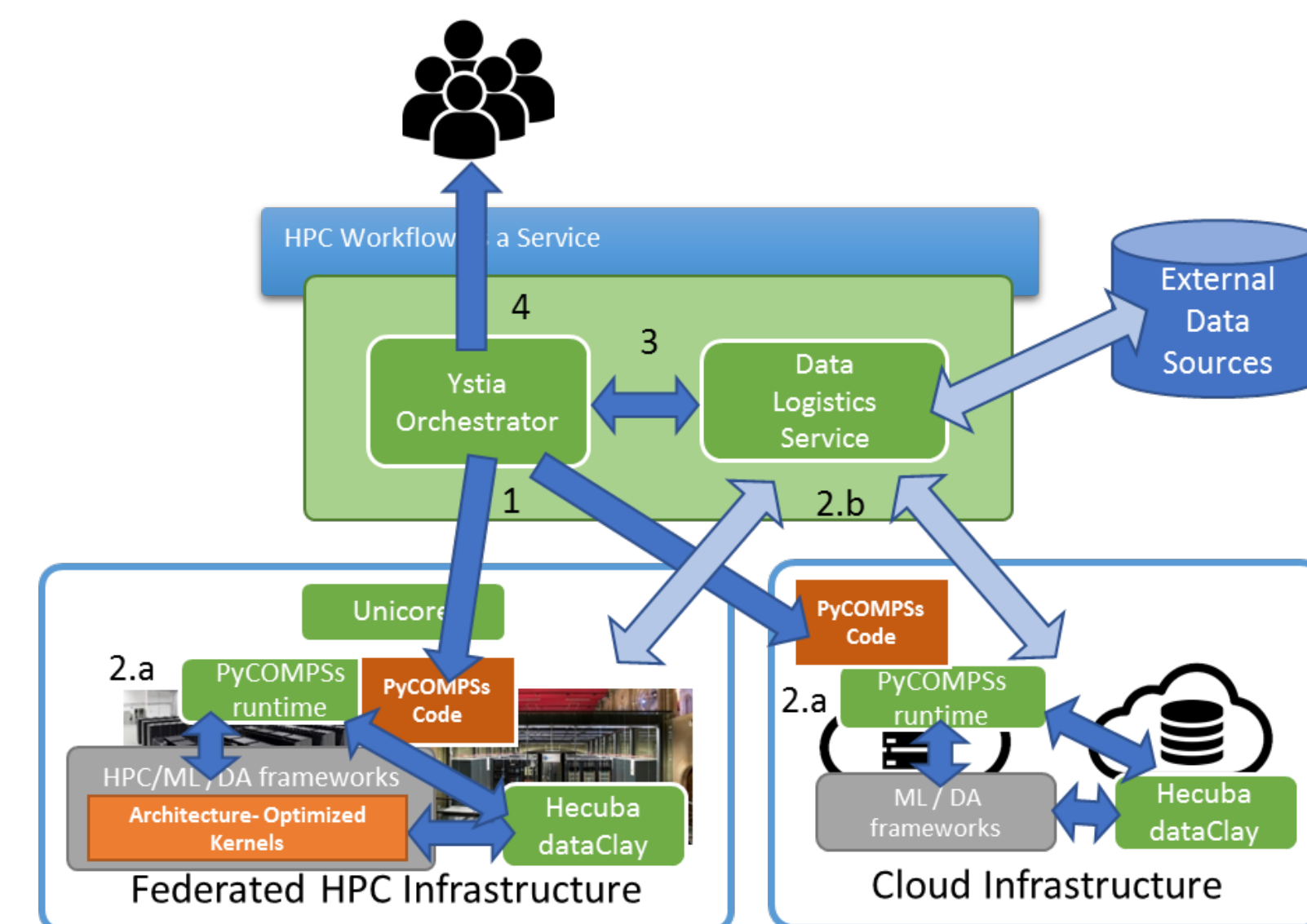
- Usernames, public-key certificates, passwords
- Users' certificates managed by an Execution API.
  - This provides a few methods to register and access credentials or generate a new secret
- User has to authorize adding credentials in the HPC cluster
- Credentials will be identified by a token attached to the user's workflow invocation.



### Deployment

Deployment orchestrated by Ystia Orchestrator

- Retrieval of workflow description
- Deployment of workflow components in the computing infrastructures
  - HPC containers built with easybuild/Spack
- Data Logistic Service – data stage-in and stage-out
  - Periodical transfers of data outside HPC systems

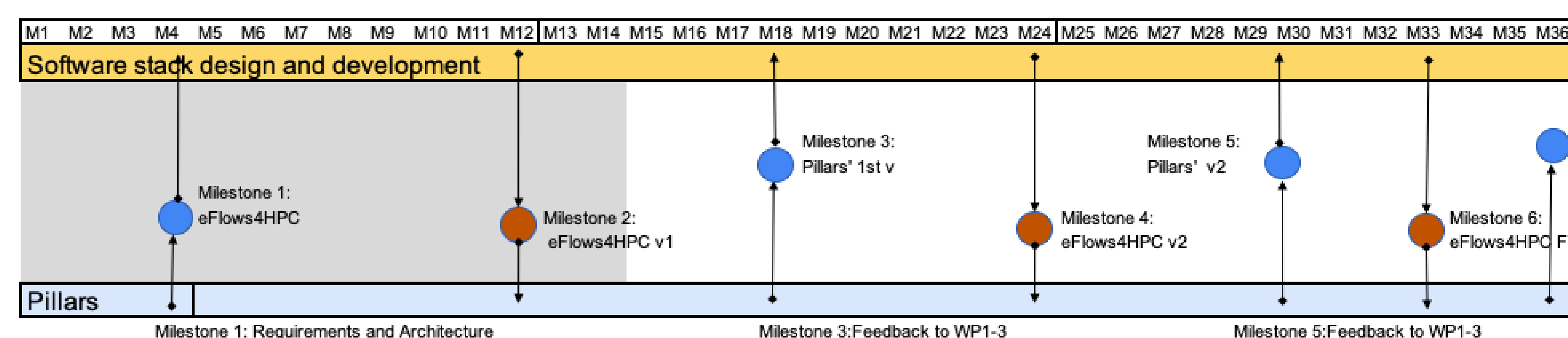


### Execution

Submission of the execution of the workflow processes to the HPC infrastructure

- PyCOMPSs orchestrates different task types
  - HPC (MPI), ML, DA
- Dynamic execution
  - Runtime task-graph
  - Task-level FT
  - Exceptions
- Data management
  - Persistent storage
- Optimized kernels: EPI, GPU, FPGA

## Project roadmap



Project duration: Jan 2021 – Feb 2024



EuroHPC  
Joint Undertaking



This project has received funding from the European High-Performance Computing Joint Undertaking (JU) under grant agreement No 955558. The JU receives support from the European Union's Horizon 2020 research and innovation programme and Spain, Germany, France, Italy, Poland, Switzerland, Norway.