

[eFlows4HPC: Enabling dynamic and Intelligent workflows in the future EuroHPC ecosystem](#)

Description

Today developers lack tools that enable the development of complex workflows involving HPC simulation and modelling with data analytics (DA) and machine learning (ML). The eFlows4HPC project aims to deliver a workflow software stack and an additional set of services to enable the integration of HPC simulation and modelling with big data analytics and machinelearning in scientific and industrial applications. The software stack will allow to develop innovative adaptive workflows that efficiently use the computing resources and also considering innovative storage solutions. To widen the access to HPC to newcomers, the project will provide HPC Workflows as a Service (HPCWaaS), an environment for sharing, reusing, deploying and executing existing workflows on HPC systems.

The workflow technologies, associated machine learning and big data libraries used in the project leverages previous open source European initiatives. Specific optimization tasks for the use of accelerators (FPGAs, GPUs) and the EPI will be performed in the project use cases. To demonstrate the workflow software stack, use cases from three thematic pillars have been selected.

- Pillar I focuses on the construction of Digital Twins for the prototyping of complex manufactured objects integrating state-of-the-art adaptive solvers with machine learning and data-mining, contributing to the Industry 4.0 vision.
- Pillar II develops innovative adaptive workflows for climate and for the study of Tropical Cyclones (TC) in the context of the CMIP6 experiment, including in-situ analytics.
- Pillar III explores the modelling of natural catastrophes - in particular, earthquakes and their associated tsunamis shortly after such an event is recorded.

Leveraging two existing workflows, the Pillar will work of integrating them with three Flows4HPC software stack and on producing policies for urgent access to supercomputers. The pillar results will be demonstrated in the target community CoEs to foster adoption and get feedback.

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