Use-Cases

DARE will be verified by developing two pilots, working together with the major European research communities of EPOS on seismology and IS-ENES on climate research.

EPOS – Rapid Seismic Assessment

Due to the availability of ever more seismic data and powerful synthetic simulation tools, seismologists are facing the challenge to effectively analyse large amounts of data in a reliable and repeatable way. These needs become even more urgent after large earthquakes as there is the necessity to provide rapidly reliable shaking estimates for emergency response purposes. DARE will provide the tools and automated orchestration of data and computational resources to tackle these issues within the context of rapid seismic assessment.

IS-ENES – Supporting Climate4Impact

Access to climate simulations is vital for the climate change impact community, that researches and assesses the societal impacts of climate change. There are several types of users that are part of this heterogeneous community, ranging from impact modelers, PhD students, research engineers, climate researchers, to practitioners, etc. These users have different needs and technical and scientific knowledge. The IS-ENES consortium has developed climate4impact.eu, a platform for easy access to climate simulations. DARE will provide climate4impact engineers with unified access to underlying data and computational resources, allowing them to develop sophisticated, on-demand services for the community.

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 dare-h2020-project

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www.demokritos.gr

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www.ingv.it/en

The University of Edinburgh
United Kingdom
www.ed.ac.uk

Centre Européen de Recherche et de Formation Avancée en Calcul Scientifique
France
www.cerfacs.fr/en

Karlsruher Institut Fuer Technologie
Germany
www.kit.edu/english/

Koninklijk Nederlands Meteorologisch Instituut
The Netherlands
www.knmi.nl/over-het-knmi/about

GRNET Greek Research and Technology Network SA
Greece
https://grnet.gr/en/

Fraunhofer Institute for Algorithms and Scientific Computing SCAI,
Germany
www.scai.fraunhofer.de/en.html

Athena Research and Innovation Centre
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www.athena-innovation.gr/en
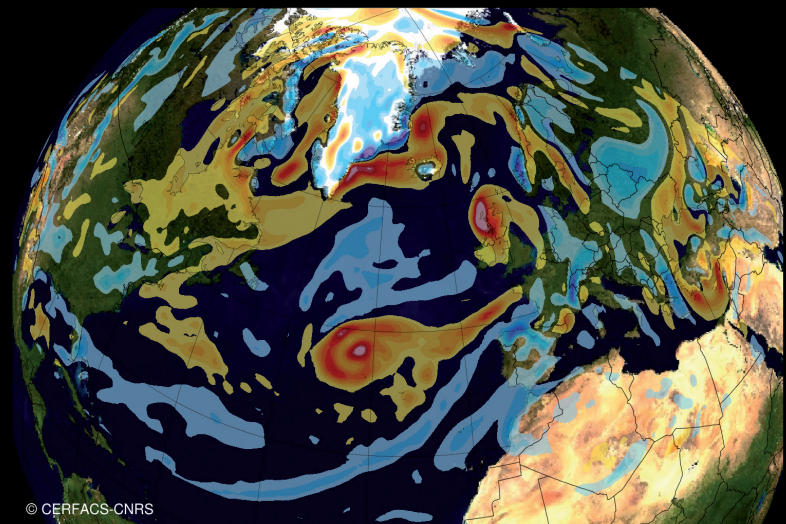
DARE

www.project-dare.eu

Introduction

The size and complexity of scientific data, as well as the difficulty in formulating domain-specific solutions in reproducible and reusable ways, may often lead to throw-away, unsustainable end-user products or long release cycles. This complexity increases exponentially with the size and diversity of input and produced data.
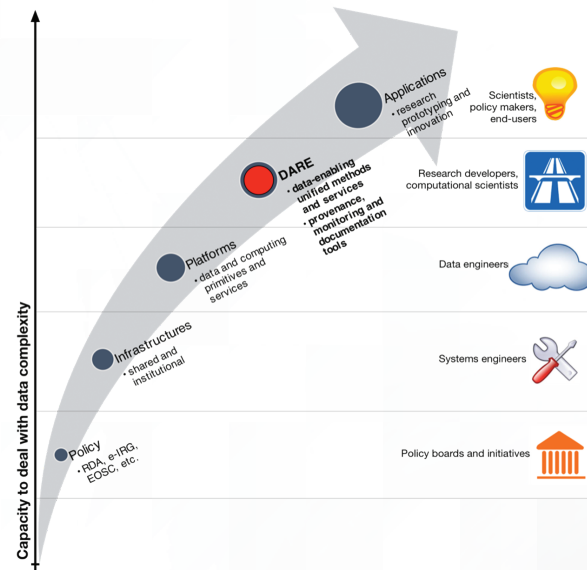
Furthermore, widely used big-data technologies and analytics, while they are known to lead to increased productivity in commercial settings, are often not taken advantage of in scientific settings.

DARE takes up these challenges to provide transparent, traceable and developer-friendly bridges over existing infrastructures and services.

Modeling of extratropical storm

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DARE

Capacity to deal with data complexity

- Applications
  · research prototyping and innovation — Scientists, policy makers, end-users
- DARE
  · data-enabling unified methods and services
  · provenance, monitoring and documentation tools — Research developers, computational scientists
- Platforms
  · data and computing primitives and services — Data engineers
- Infrastructures
  · shared and institutional — Systems engineers
- Policy
  · RDA, e-IRG, EOSC, etc. — Policy boards and initiatives

Objectives

DARE objectives are:

▶ to provide teams of research developers and scientists who work on the intersection of software engineering and scientific domains with a unifying, developer-friendly hyper-platform over existing e-infrastructures.

▶ to provide semantics-ready and big-data technologies in order to enable rapid prototyping of reproducible and efficient research solutions onto specific domain applications.

▶ to improve further and integrate tried and tested programmatic dataflow specification APIs, big- data technologies and provenance/data lineage solutions to address the requirements of European RIs, initially of EPOS, on Earth science, and IS-ENES, on climate.

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The DARE Platform

Building on the container-based Big Data Integrator platform, the DARE platform enables:

Optimizing fine-grained workflows executable on various contexts e.g. MPI and Spark, through the dispel4py workflow specification library.

Data Provenance to facilitate monitoring and reproducibility as well as to optimise and automatically map high-level workflows onto underlying systems.

Semantics and metadata describing different aspects of experimental runs.