# Open Science at CERN

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# Introduction

**Role of the European Open Science Cloud (EOSC):**

**Develop a single European market for research data and services**

- Enable interdisciplinary research
- Develop a web of FAIR Data and Services
- Support Open Science

**CERN:**

- Aligns with the Open Science Vision
- Examples:
  - CERN Open Data Policy
  - EOSC Projects

CMS
CMS
CERN
1 PB/sec
>2000 disks/sec
LHCb
LHCb
ALICE
ALICE
ATLAS
ATLAS

# Historical Commitment to Open Science

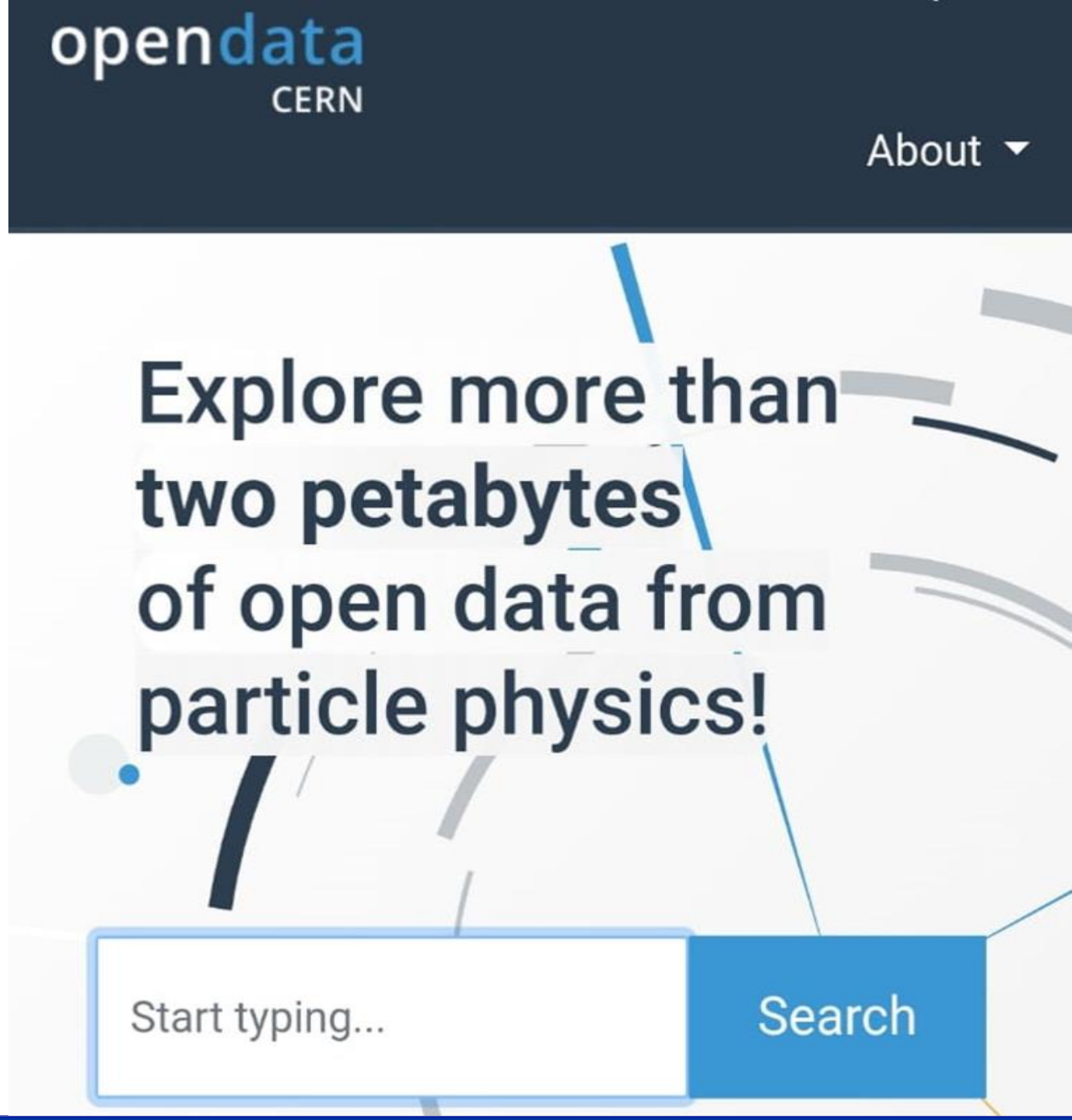
**Open Science part of the CERN convention (signed In 1953)**

**2014: Open Access Policy**

**All CERN physics results to be published Open Access**

# CERN Open Data Policy

- **Launched in December 2020**
- **Aim: make scientific research reproducible, accessible, and collaborative**
- **Agreed upon the 4 experiments**
  - A blueprint for other High Energy Physics projects
- **Data released ~5 years after collection**
  - Through the CERN Open Data Portal
  - Follow FAIR Principles



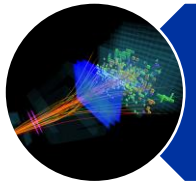
# Which data ?

**Level of complexity of HEP data:** defined by the Data Preservation and Long Term Analysis in High Energy Physics Study Group

| | |
|---|---|
| **Level 1** | Peer-reviewed publications and additional information and data linked to the publications |
| **Level 2** | Data for education and outreach provided in simplified format |
| **Level 3** | Reconstructed subset of data with the necessary level of details for algorithmic, performance and physics studies |
| **Level 4** | Raw data |

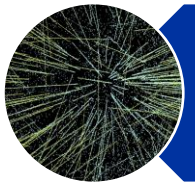
**Data released thanks to CERN Open Data Policy**

# Which use cases ?

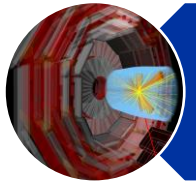


Reinterpretation and reanalysis of physics results

Education and outreach



data analysis for technical and algorithmic developments



Physics research

# Examples of services supporting Open Data

- User-driven development addressing a variety of physics use cases
- Enabling long-term preservation and reuse for data, code, analyses, etc..
- Open source software
- Open access licenses
- Data policies with embargo periods
- Persistent identifiers
- Data & software citation
- Machine readable, high quality metadata
- Provisions for big data and high complexity
- Aligning with FAIR principles
- Adjustable to be discipline agnostic

# European Open Science Cloud (EOSC) Projects

EUROPEAN OPEN SCIENCE CLOUD

# EOSC Projects

**CERN involved in several EU projects working towards Open Science:**

- R&D in archiving and data preservation services

- R&D in federated services for cloud synch & share

- Onboarding commercial cloud for European research Community

# OCRE | Open Clouds for Research Environments

A consortium formed by:

GÉANT

CERN

RHEA GROUP

Trust-IT Services
Communicating ICT to markets

Aim: Accelerate cloud adoption in the European research community

Budget: 9.5M euro

Starting Date: January 2019

Duration: 36 Months

# CERN activities in OCRE

Cloud voucher distribution to the Long Tail of Science

**Aim:** stimulate the uptake of commercial digital services by researchers in Europe

# Cloud Voucher Distribution

**GEANT ran Call off ran in Q2 2019 under GEANT IaaS framework**

- Total Amount procured: €500 000
- Voucher face value: €500 to €2000

**3 cloud providers:**

CloudSigma

SPARKLE

aws

Micromail

AN ERGO COMPANY

Microsoft Azure

**3 distribution channels:**

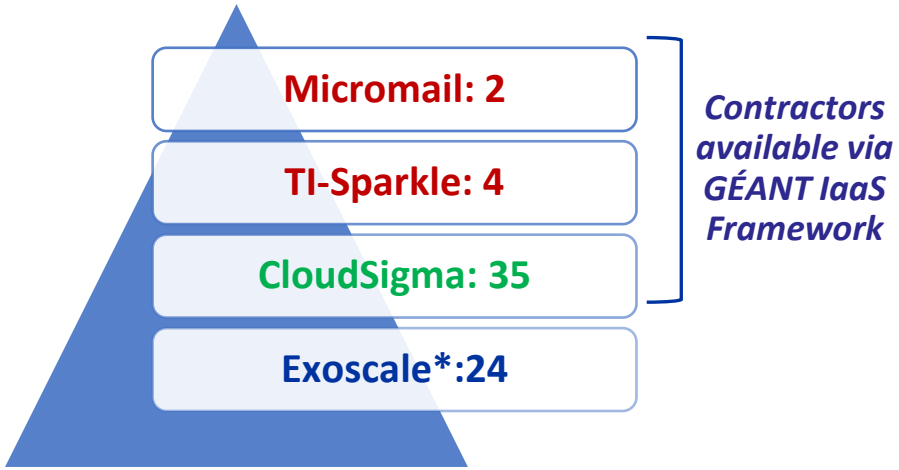
MARIE CURIE ALUMNI

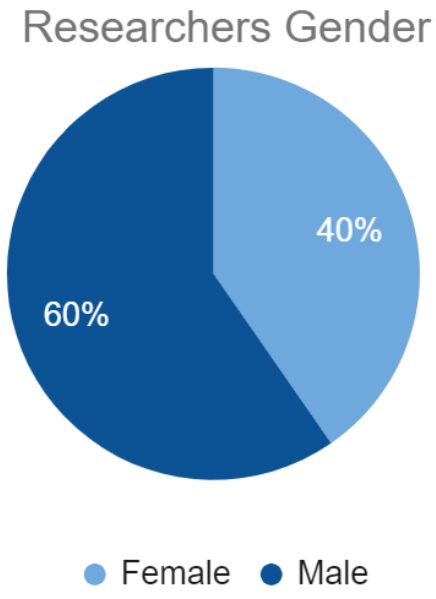
eurodoc

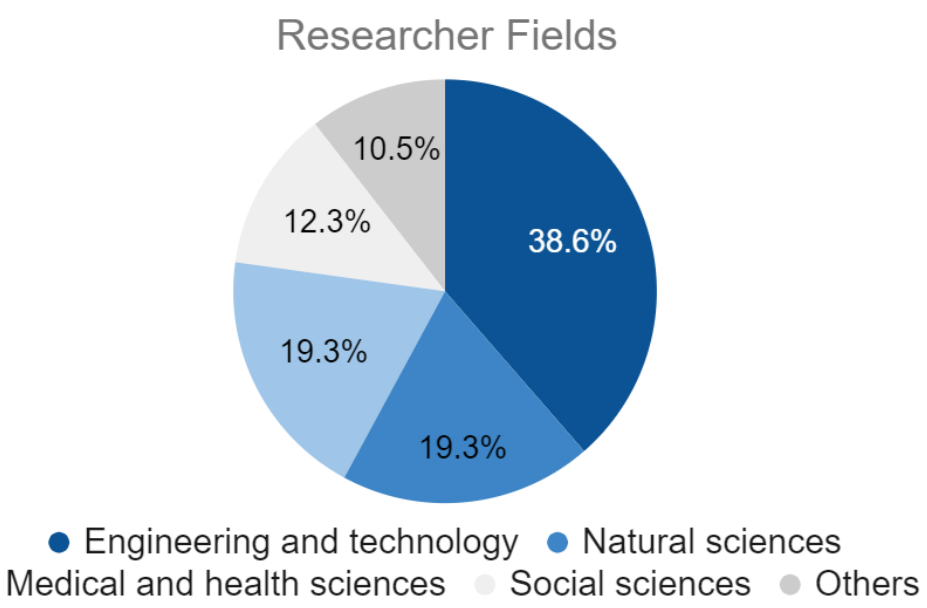
The European Council of Doctoral Candidates and Junior Researchers

EOSC-hub

# Cloud Vouchers Distribution




* Open Call via CERN openlab

# Feedback and Lessons Learned

**Small scale, time limited calls**
= easier to manage



**Training materials and support**
= key to increase uptake

**Vouchers face value of several thousands of Euros**
= necessary to ensure results

**Voucher usage tracking & re-allocation of unused vouchers**
= essential to avoid wasted resources

**Exit strategies & re-allocation**
= crucial to ensure uptake

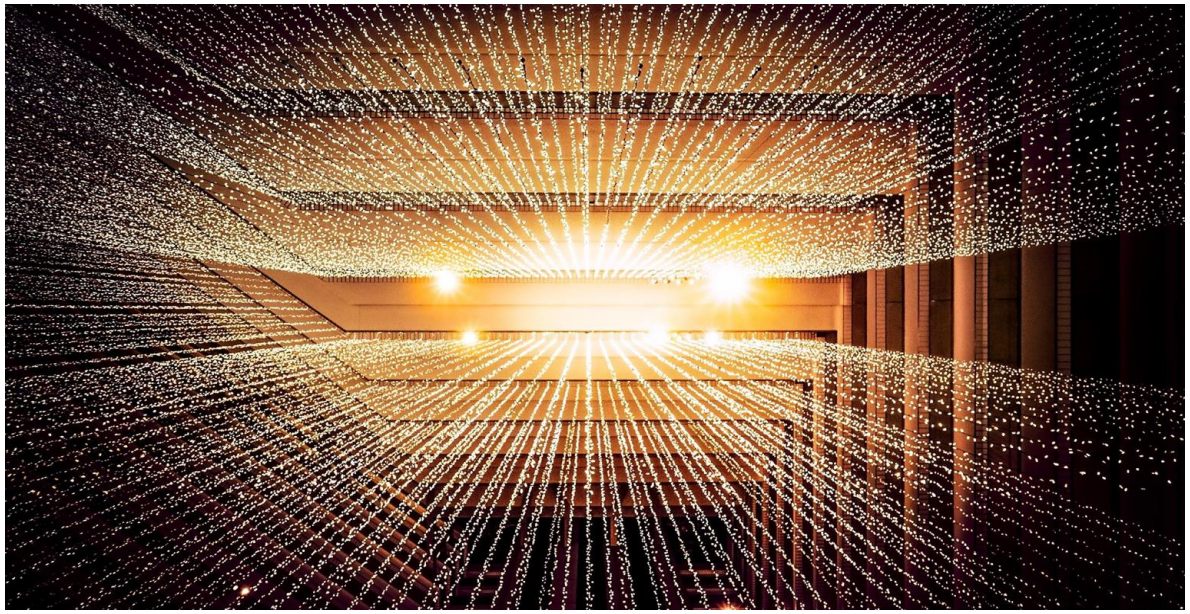
# Next steps

## Expand the voucher program

Subject to the contract being adjourned by GEANT

## Test and validate the 27 cloud platform available in OCRE

Benchmark in Machine Learning, HPC…



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