ScienceMesh: pan-European collaboration fabric for Science

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8th May 2023, CHEP, Norfolk, USA

CS3MESH4EOSC - Interactive and agile/responsive sharing mesh of storage, data and applications for EOSC, has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no. 863353.

Outline

- Intro to (some) CERN Scientific services
- Outreach and Education opportunties
- Cross-institutional challenges
- ScienceMesh
- Summary

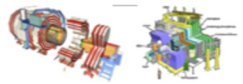
CERNBox

- CERNBox is CERN's on premise cloud collaboration platform.
- Deeply intergrated with CERN scientific services portfolio
- Poster session tomorrow

CERNBox

37K user home directories

+1K Project Areas



Supporting +31 E

1st CERNBox User Forum

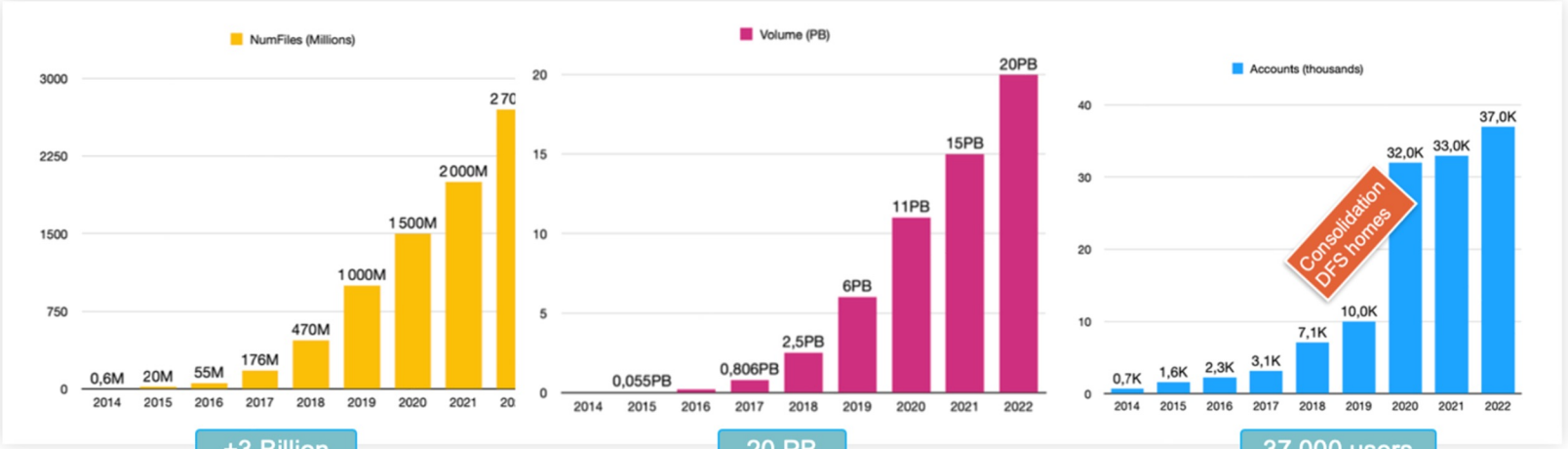
- 193 registered users
  - 172 unique users in Zoom
  - Peak of ~90 concurrent users
- 56+ institutions
- 31 speakers
- All CERN departments represented

CERNBox: User Stories, Proposed Features and Opportunities for Improvements

- +1000 Project areas
- 31 LHC and non-LHC experiments working areas

13k unique users/month

Skyrocketing usage



+3 Billion

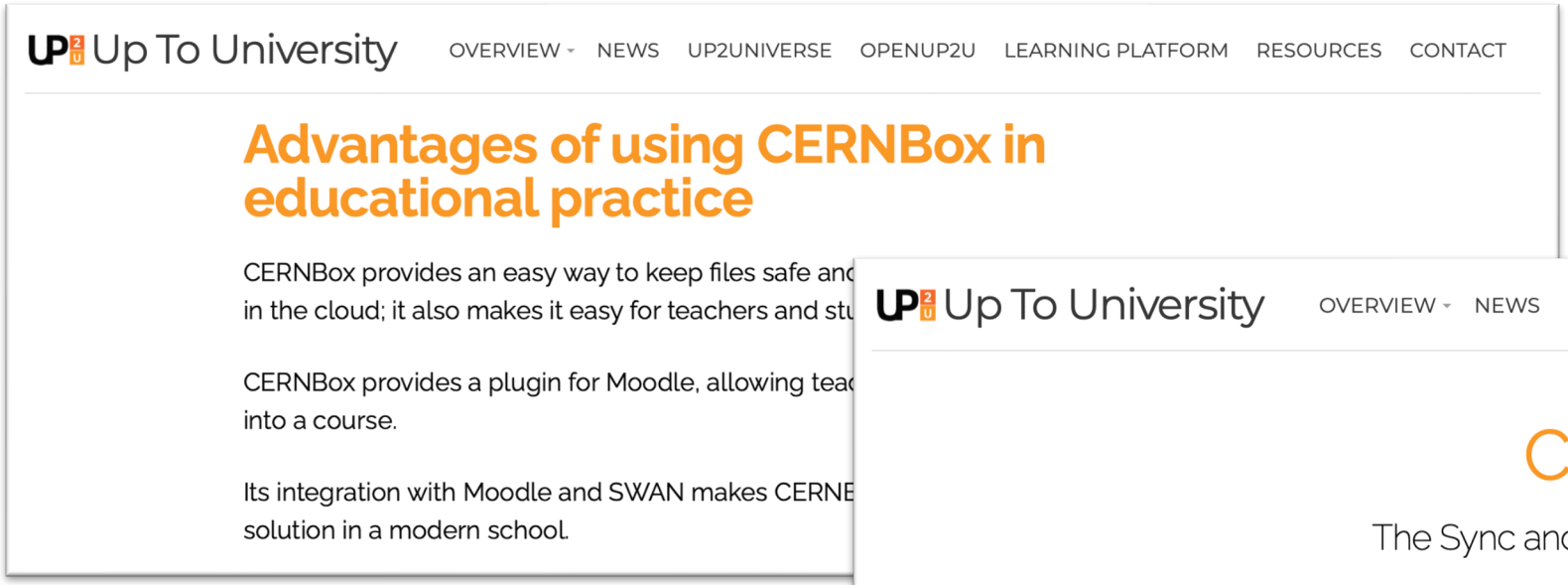
20 PB

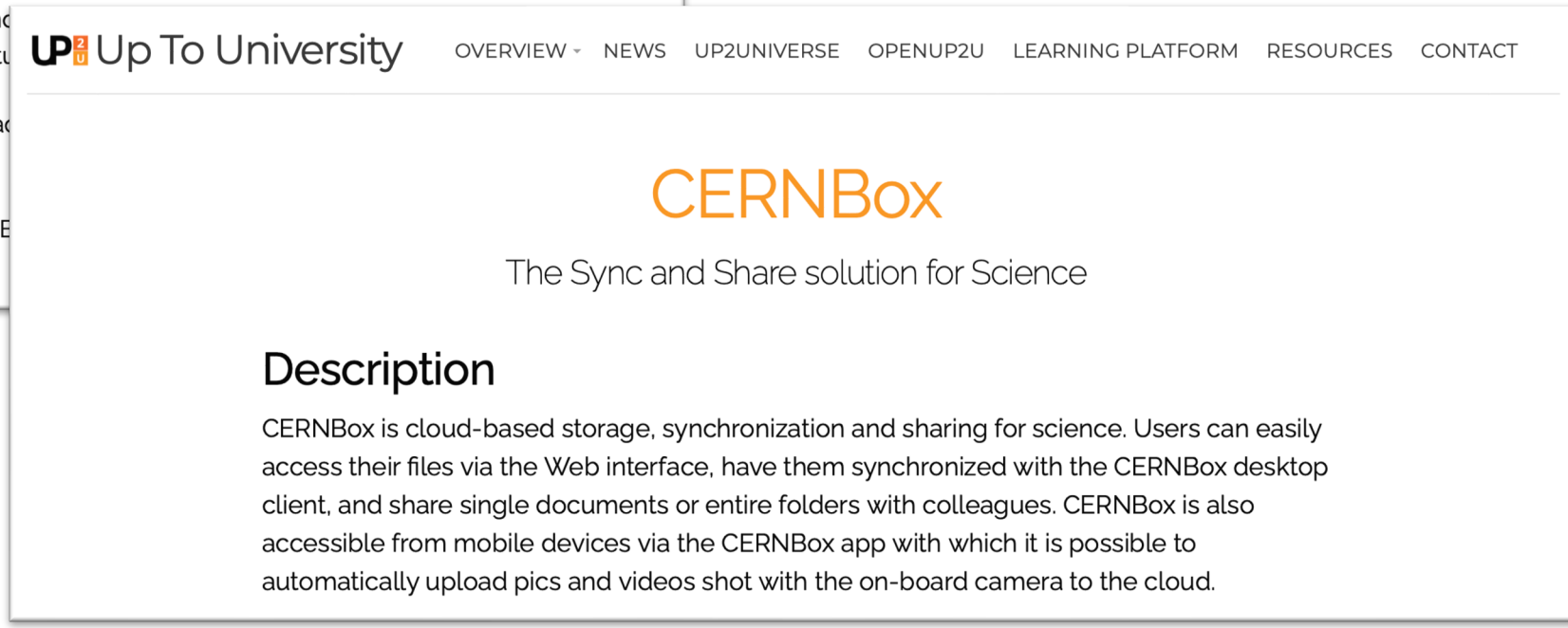
37 000 users

CERNBox user community

Some Outreach and Educational activities

Helping students to reach their educational goals





More on "ScienceBox 2.0: Evolving the demonstrator package for CERN storage and analysis services¶"
Tueday @ 11:15, Enrico Bocchi

RUN3

The third run of the Large Hadron Collider has successfully started

A round of applause broke out in the CERN Control Centre on 5 July at 4.47 p.m. CEST when the Large Hadron Collider (LHC) detectors started recording high-energy collisions at the unprecedented energy of 13.6 TeV

5 JULY, 2022

Celebrations at the CERN control centre (CCC) to mark the start of LHC Run 3 (Image: CERN)

A round of applause broke out in the CERN Control Centre on 5 July at 4.47 p.m. CEST when the Large Hadron Collider (LHC) detectors switched on all subsystems and started recording high-energy collisions at the unprecedented energy of 13.6 TeV, ushering in a new physics season. This feat was made possible thanks to the operators who had worked around the clock since the restart of the LHC in April to ensure the smooth beginning of these collisions with higher-intensity beams and increased energy.

After over three years of upgrade and maintenance work, the LHC is now set to run for close to four years at the record energy of 13.6 trillion electronvolts (TeV), providing greater precision and discovery potential. Increased collision rates, higher collision energy, upgraded data readout and selection systems, new detector systems and computing infrastructure: all these factors point to a promising physics season that will further expand the already very diverse LHC physics programme!

Pictures of the day are available here.

Videos of the event are accessible here.

CERNBox

https://cernbox.cern.ch/index.php/s/EacPckkCMFcJ8ya

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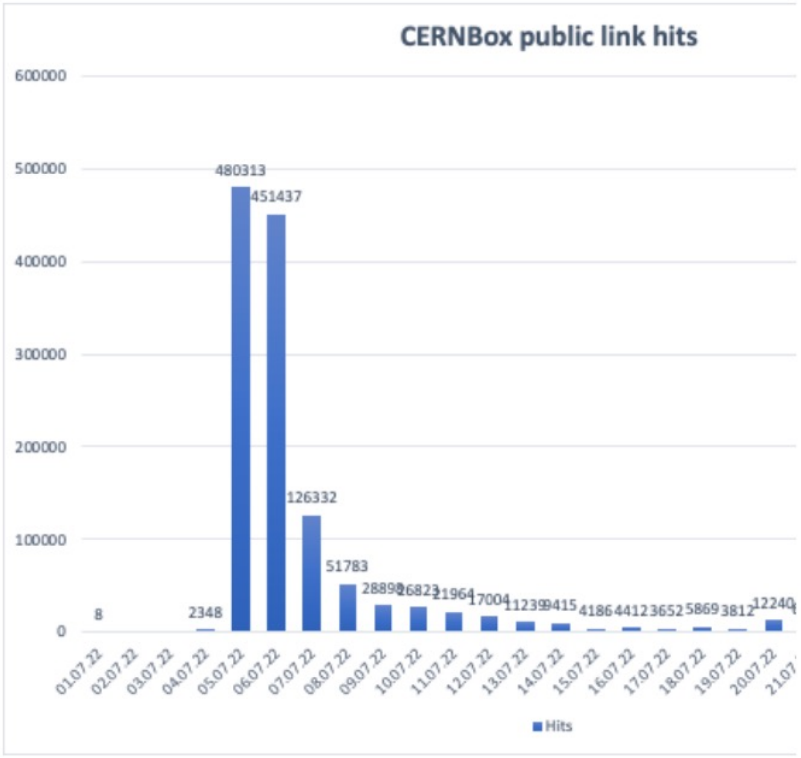
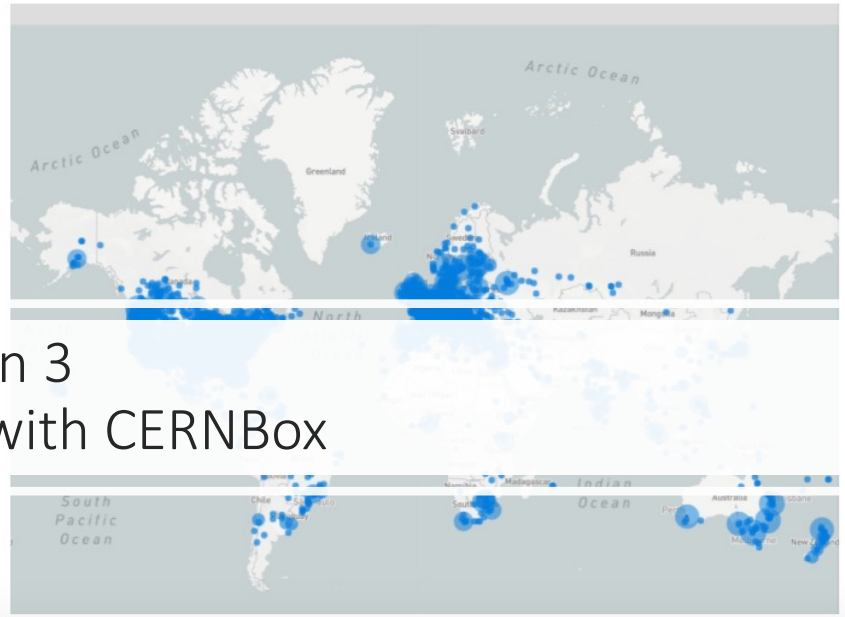
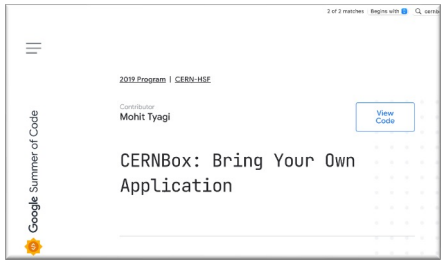


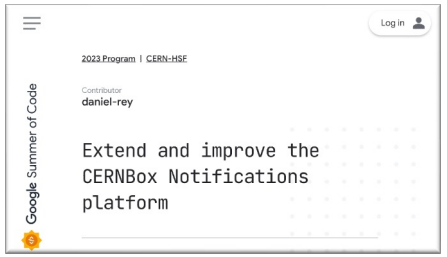


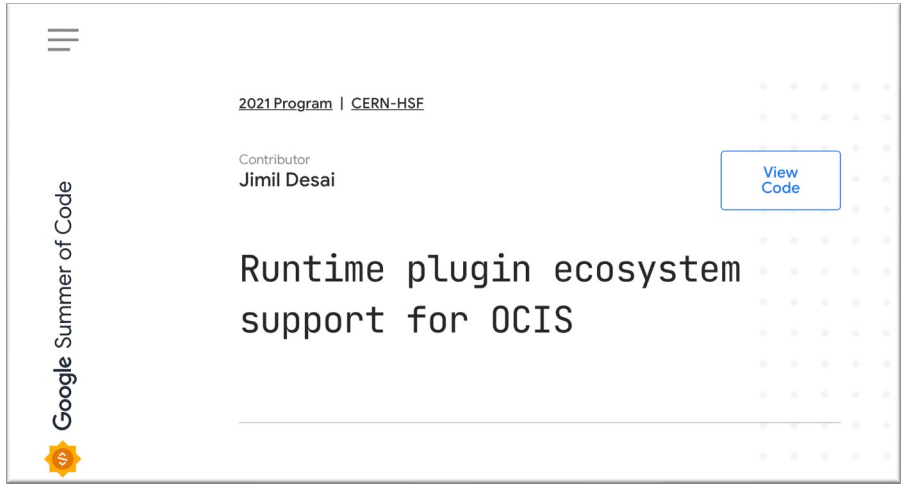
LHC Run 3
Media Coverage with CERNBox

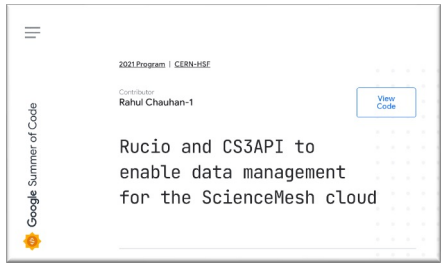
CERNBox, GSOC, HSF and Open Source

- **Sourcing talent while promoting science**









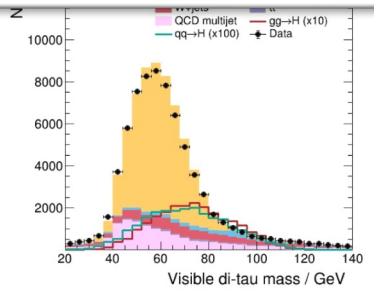
SWAN, Education and Outreach

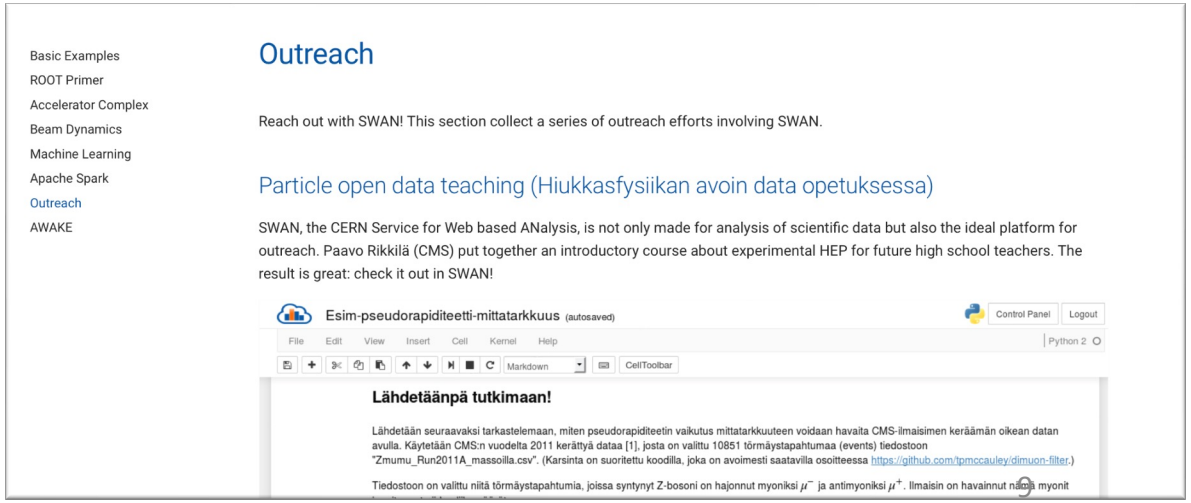
> Frequent requests to use SWAN during schools or workshops
- Exercise sessions at the CERN School of Computing
- Tutorials of analysis tools: ROOT workshop for summer students

> Requests that include GPUs for ML are becoming more common
- "I need XX GPUs to use SWAN during a course about ML"
- Three examples already in 2023: ATLAS ML workshop, iCSC and Italian Teacher Programme

Outlook

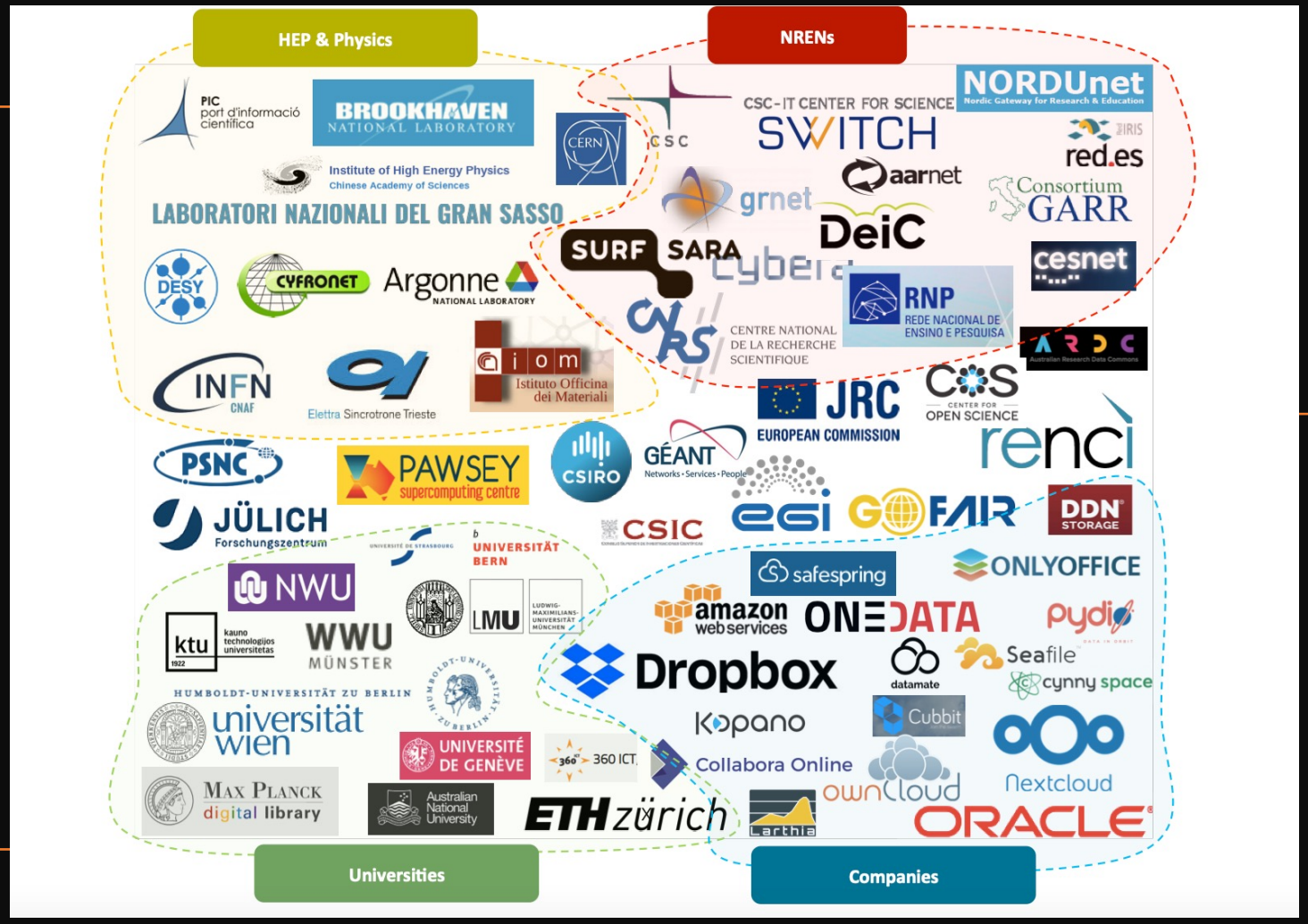
- CERN Open Data portal is constantly growing
  - Data access policies of the ALICE, ATLAS, CMS and LHCb ensure vast amount of new data
- Ongoing effort to publish legacy CMS data in NanoAOD format
  - Reduced data format detached from experiment specific software
  - Suits a wide range of analyses
  - Allows for analyses with simple programming model
    → Bringing students and individuals close to real physics data from the LHC with minimal technical know-how
    → Example: ROOT RDataFrame
- **SWAN together with the Open Data portal would be the perfectly suited to bring HEP as close as possible to students and individuals**





European landscape

- **CS3 Site Reports:**
- **>30 PB** of data
- **> 20 nodes**
- **> 600, 000 users**
- **> 3.5 billion files/directories**
- **> 1 million shares**
- **Great uptake of Cloud Sync and Share and JupyterNotebook**
- **Satisfying needs of local users**



But …

- Researchers remain isolated on data islands because these services aren’t interconnected
- No common, ratified API among NRENs
- Hard to share add-ons between NRENs
- Not benefiting from economy of scale

Also raised during the pre-CHEP HSF workshop

- **Ability to collaborate in a multi-organizational team on a single resource**
- **Ability to efficiently access collaboration data as well as make intermediate data products available to the team**

Analysis Facilities White Paper

Diego Ciangottini (INFN Perugia, Editor), Alessandra Forti (University of Manchester, Editor), Lukas Heinrich (Technische Universität München, Editor), Nicola Skidmore (University of Manchester, Editor),

Abstract

This whitepaper presents the current status of the R&D for analysis facilities and attempts to summarize the current views on the future direction of these facilities. These views have been collected through the High Energy Physics (HEP) Software Foundation's (HSF) Analysis Facilities forum, established in March 2022, and through the Analysis Ecosystems II workshop that took place in May 2022.

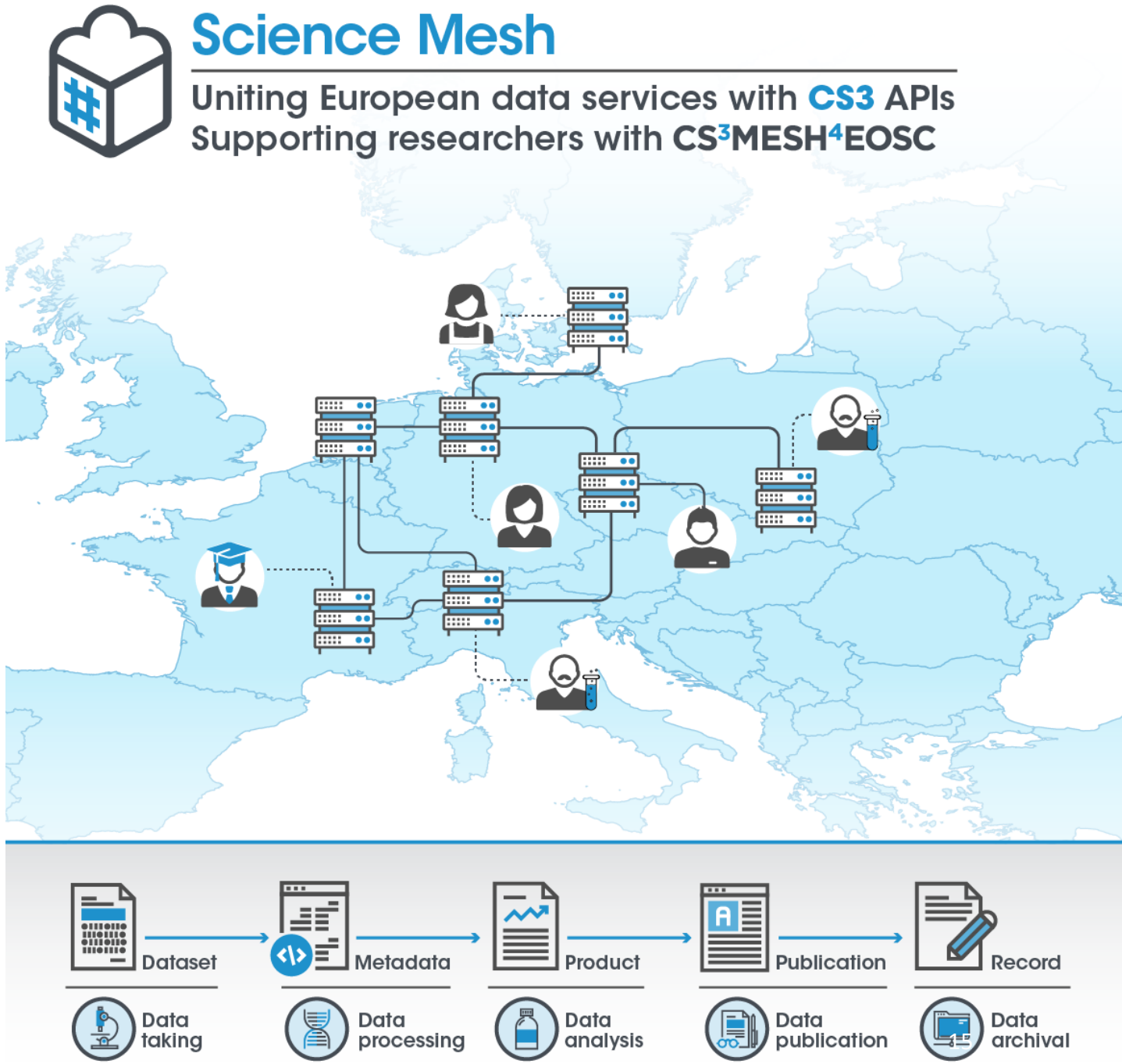
Introduction

In the HL-LHC era (to begin in 2029) LHC analysts will have over an order of magnitude more data to analyze than currently. This will require significant changes to analyses techniques and workflows some of which may be better suited to run using cloud technologies and

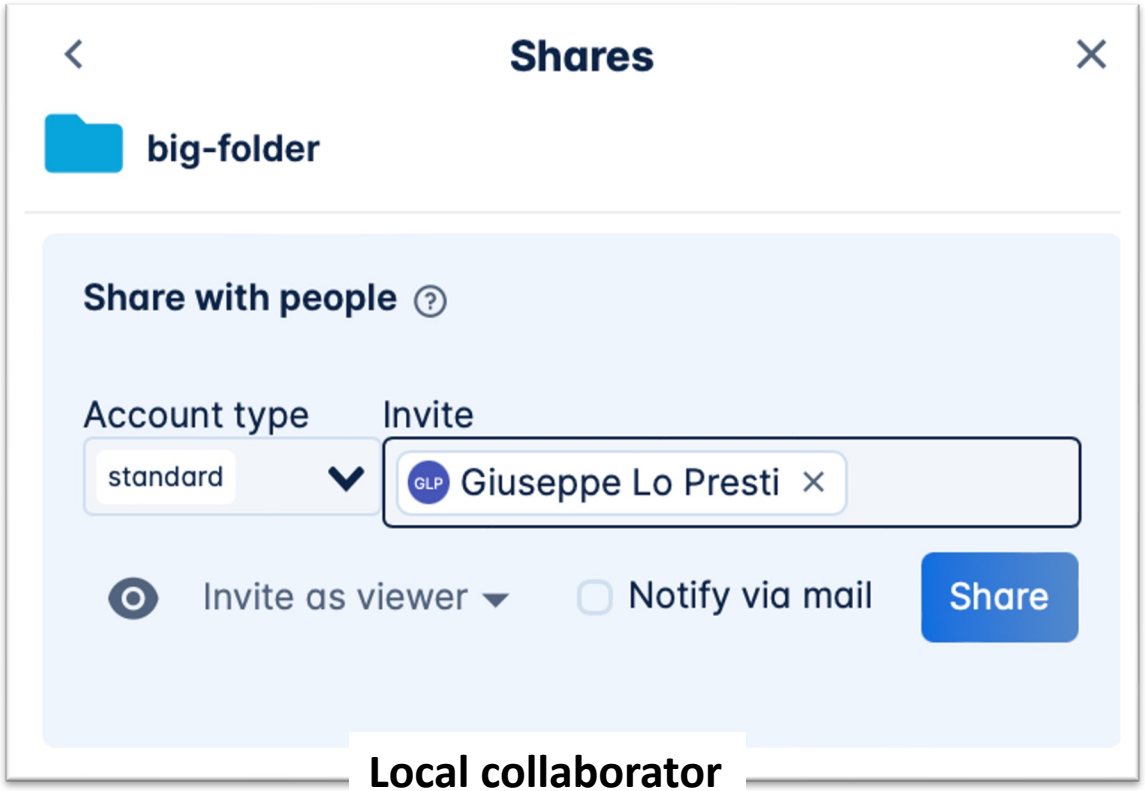
There is an important demand for users to collaborate beyond their local clouds

Science Mesh
One way to remove barriers

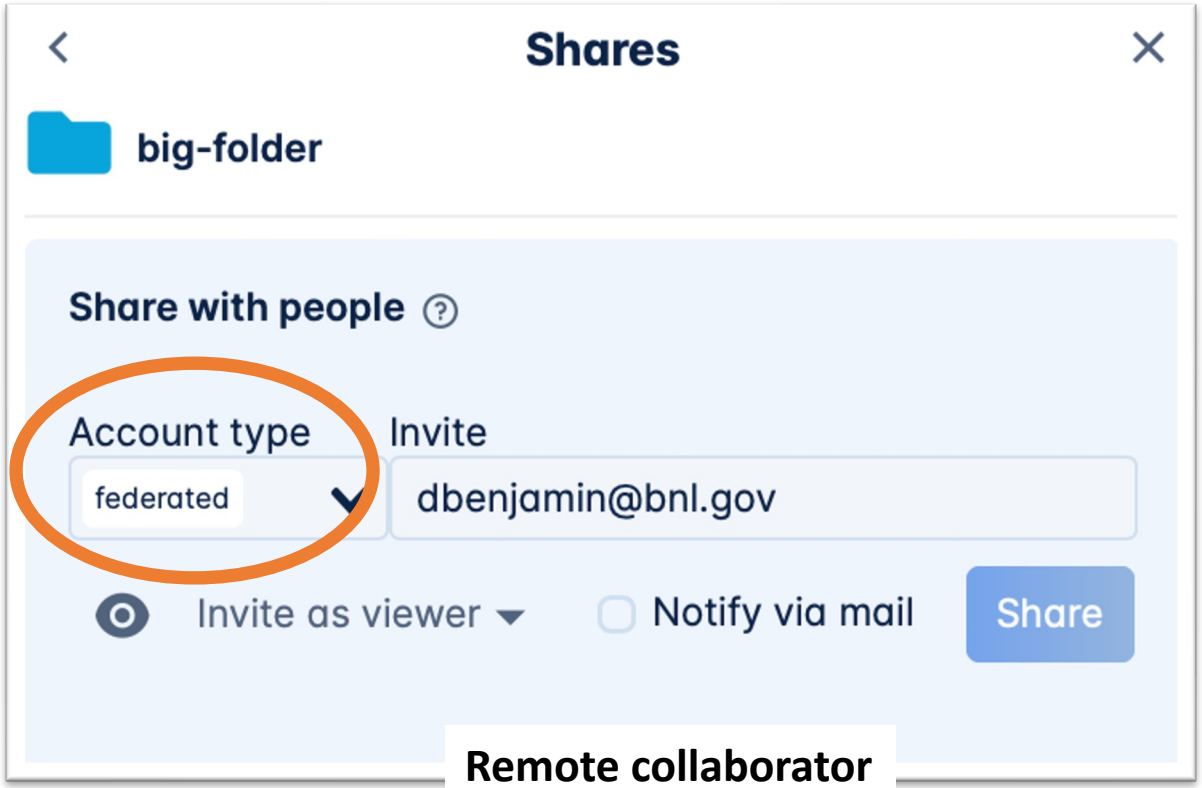
- ScienceMesh is a **trusted federation** of nodes
- Users can **collaborate with remote users** with the same UX as if they were local users
- Built with Open Standards and Open-Source Software
- Allows **interoperability** of clouds



Sharing of data beyond cloudds



Local collaborator



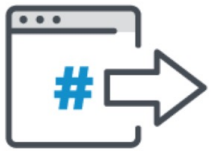
Remote collaborator

Increasing value

Data Science Environments

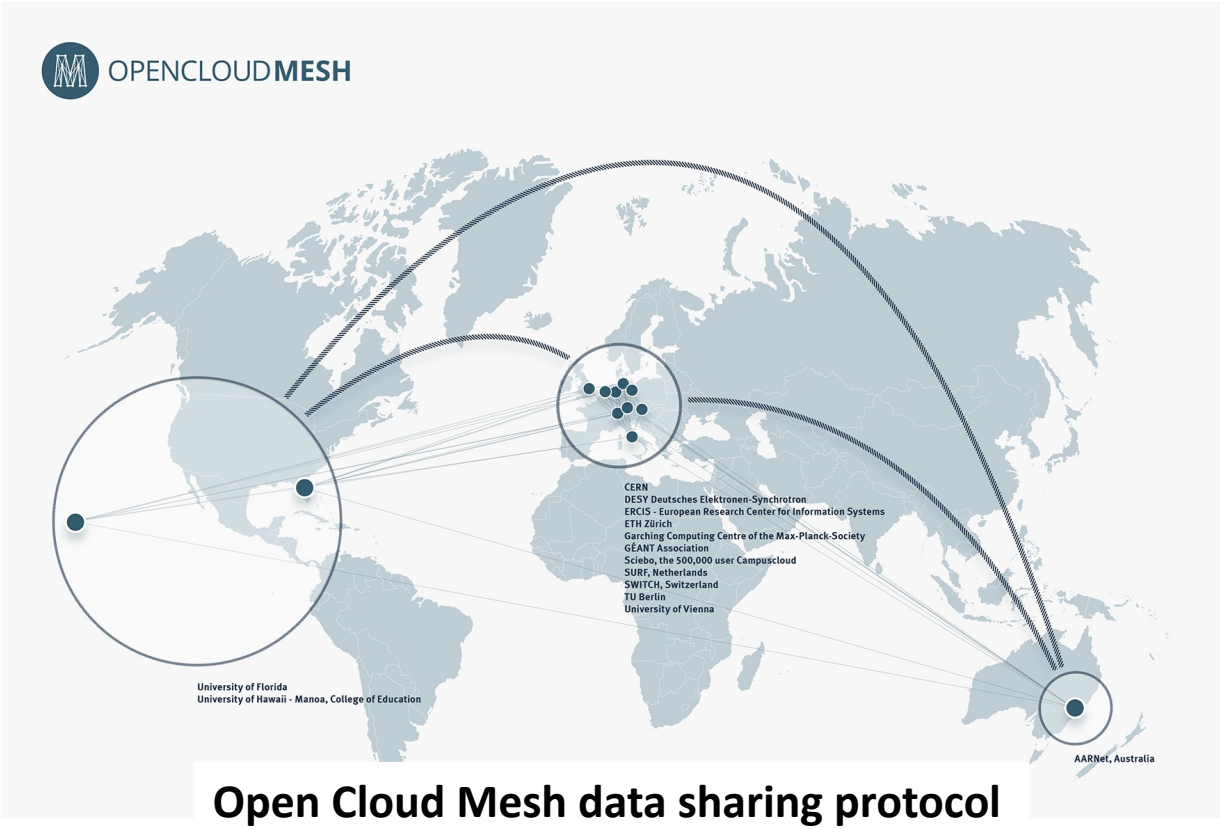
Open Data Systems

Collaborative Documents

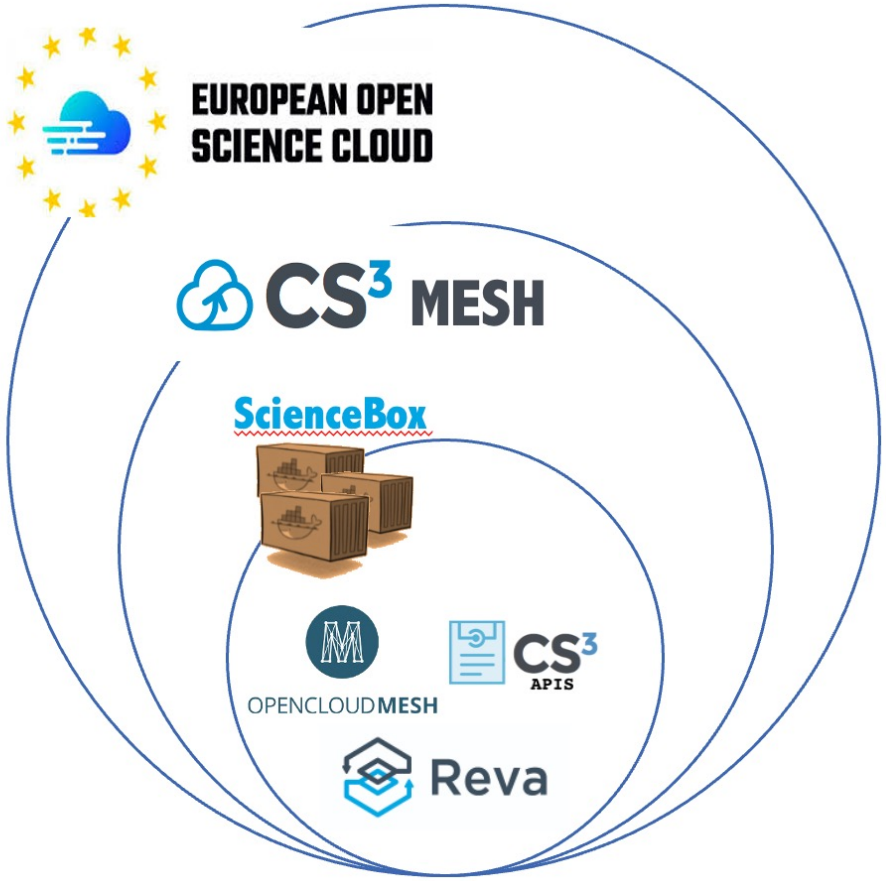


On demand large dataset transfer

Building blocks



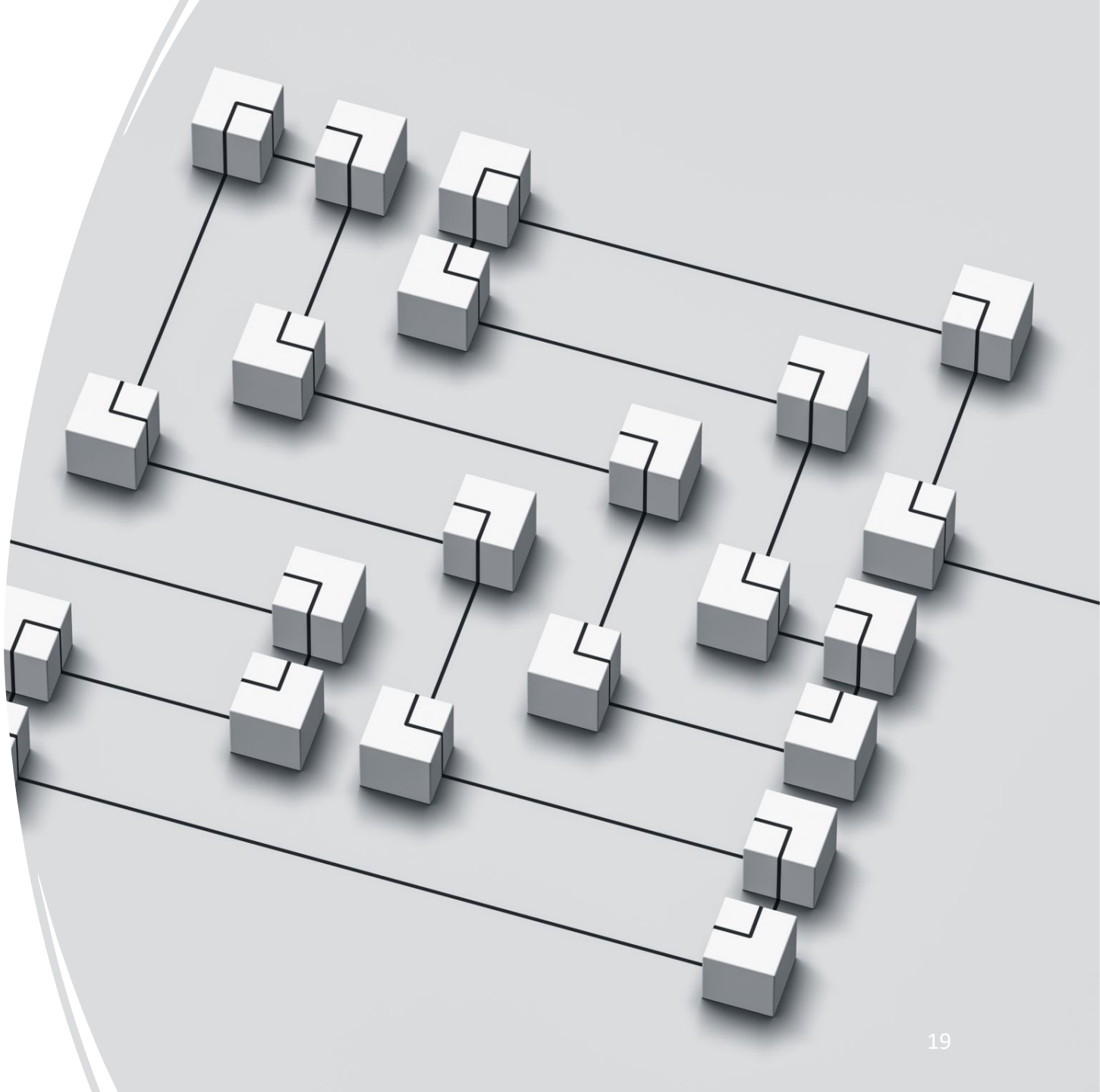
Open Cloud Mesh data sharing protocol

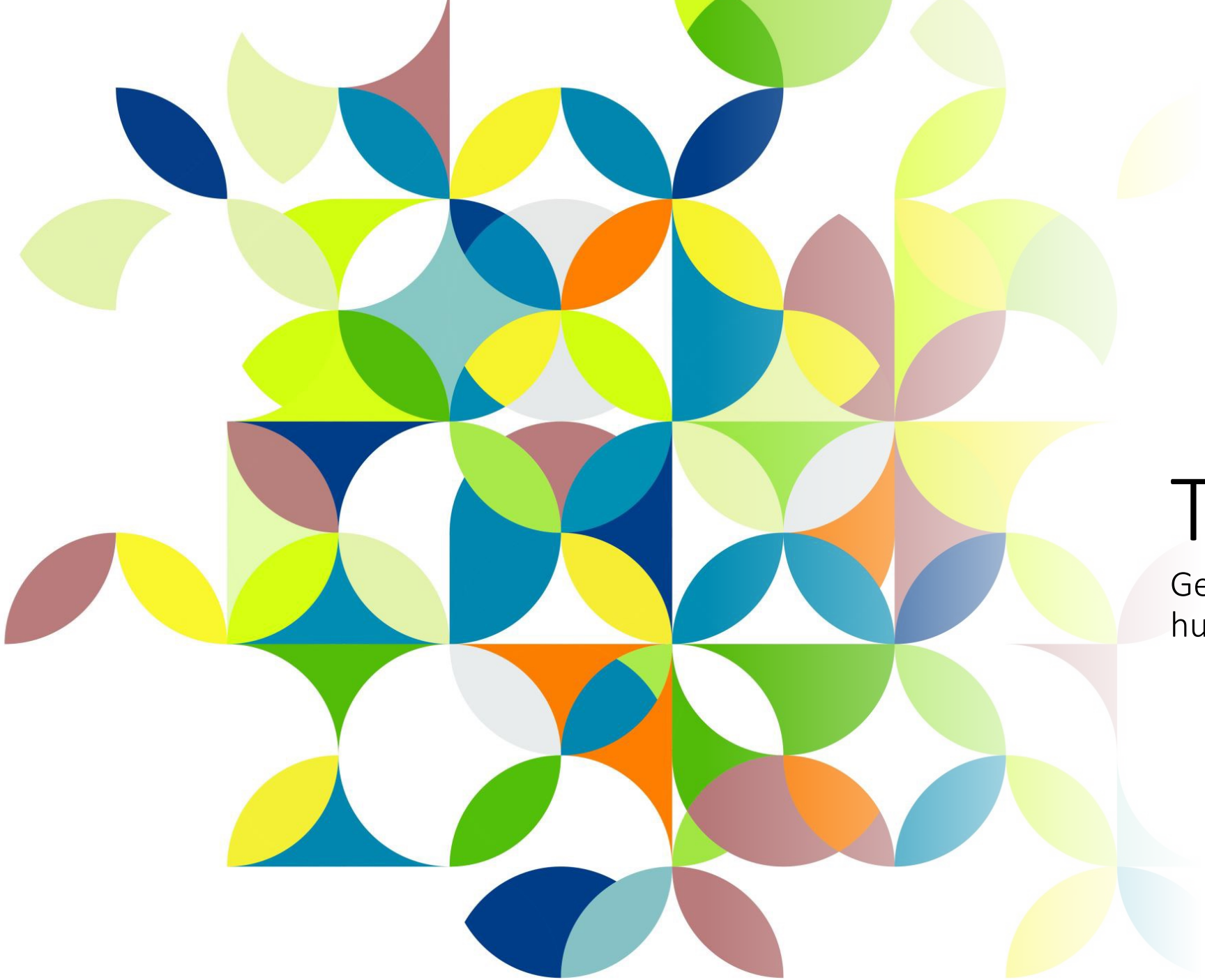


Interoperability platform

Requirements to join the mesh

- Have a deployment of ownCloud or NextCloud EFSS platforms
- Follow the instructions to join as a node in the trusted federation https://sciencemesh.io
- Get in touch
- Workshop on EGI Conference June 2023





Thank you

Get in touch:
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