



CS³
MESH⁴
EOSC

Connecting European Data



ScienceMesh: an interoperable federation of EFSS services

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CS3 2023

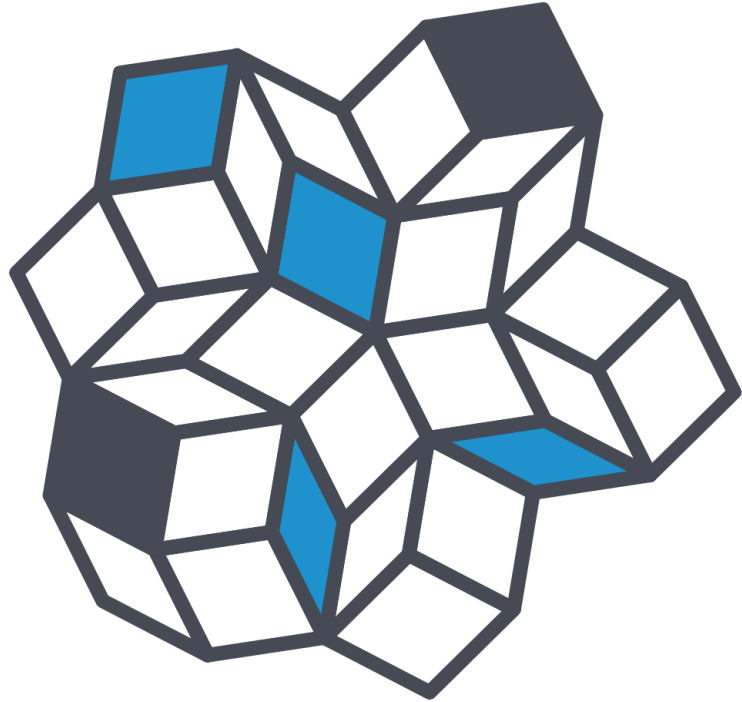


CS3MESH4EOSC has received funding from the European Union's Horizon 2020 Research and Innovation programme under **Grant Agreement No. 863353**.



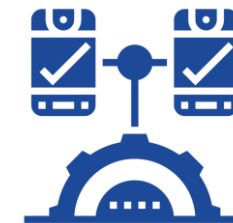
07/03/2023





Science Mesh

- # Born out of 3.5-year EU Project
- # Decentralized **Mesh of EFSS nodes**
 - # *From our community!*
- # Based on **Open Standards** and **Open Source Software**
- # **Federated** research space for Europe`
- # **Interoperability Platform** to develop and connect new applications

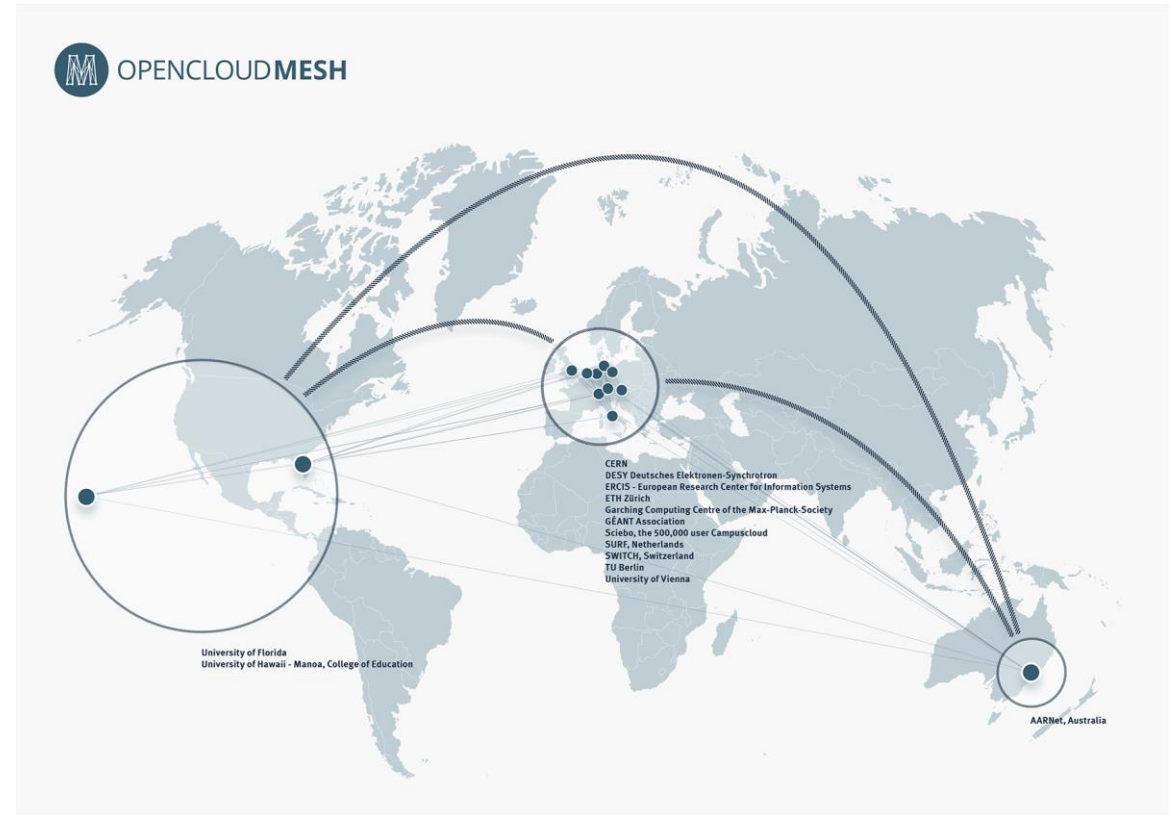


3 Dimensions

A trust-based federation

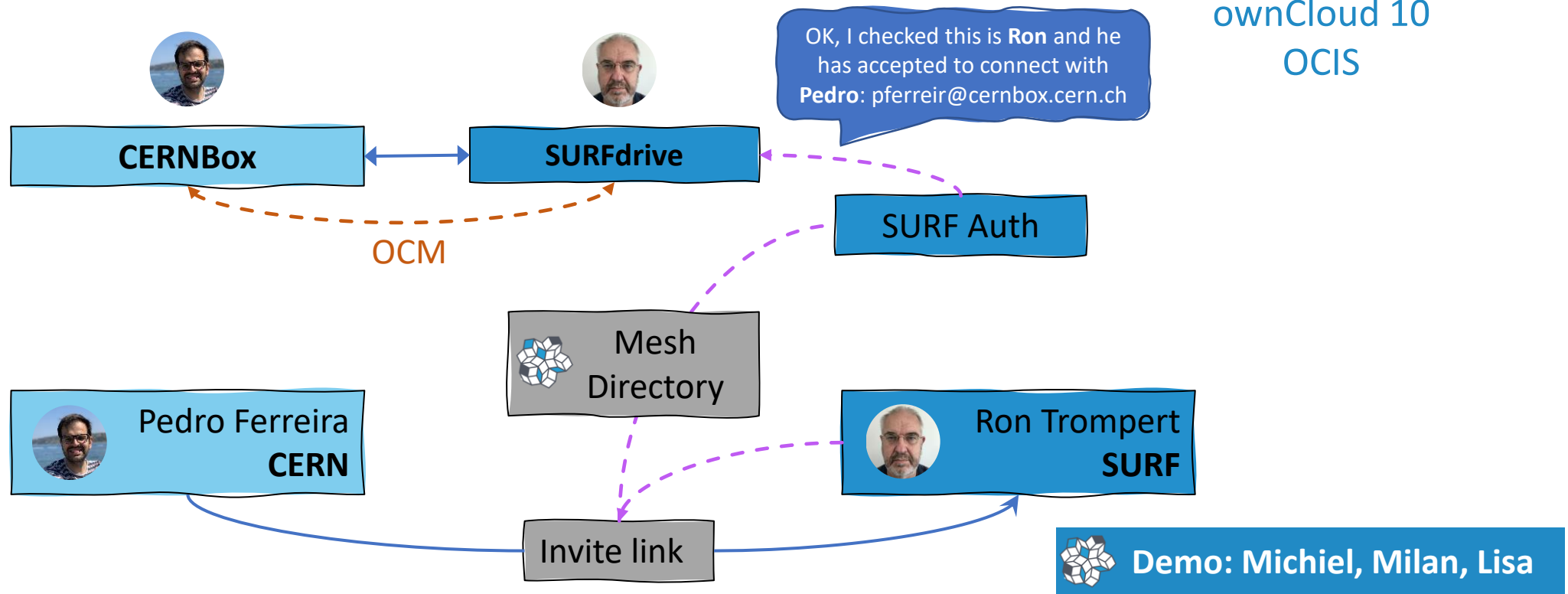
- # OpenCloudMesh – common file access layer across organizations
- # Implemented by ownCloud, Nextcloud and Seafile
- # Perfect for 1:1 communication between nodes

- # **We “just” need to know the other person’s user name on the target system**

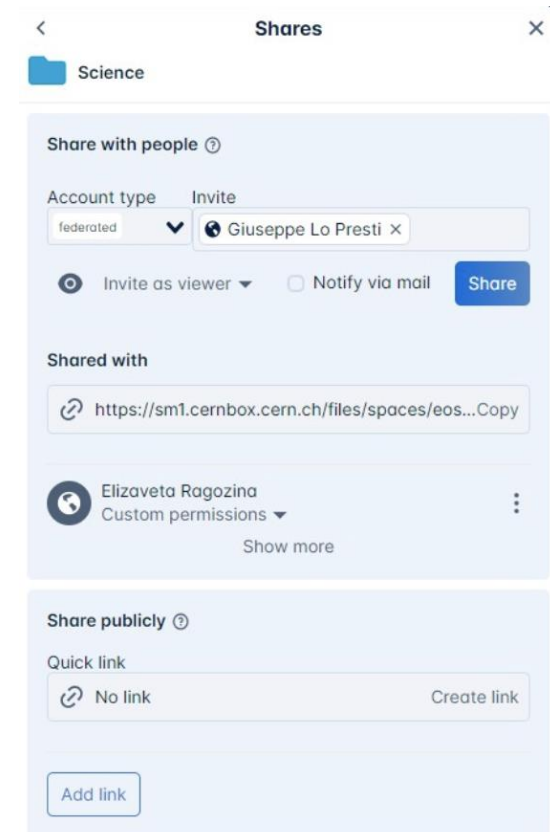
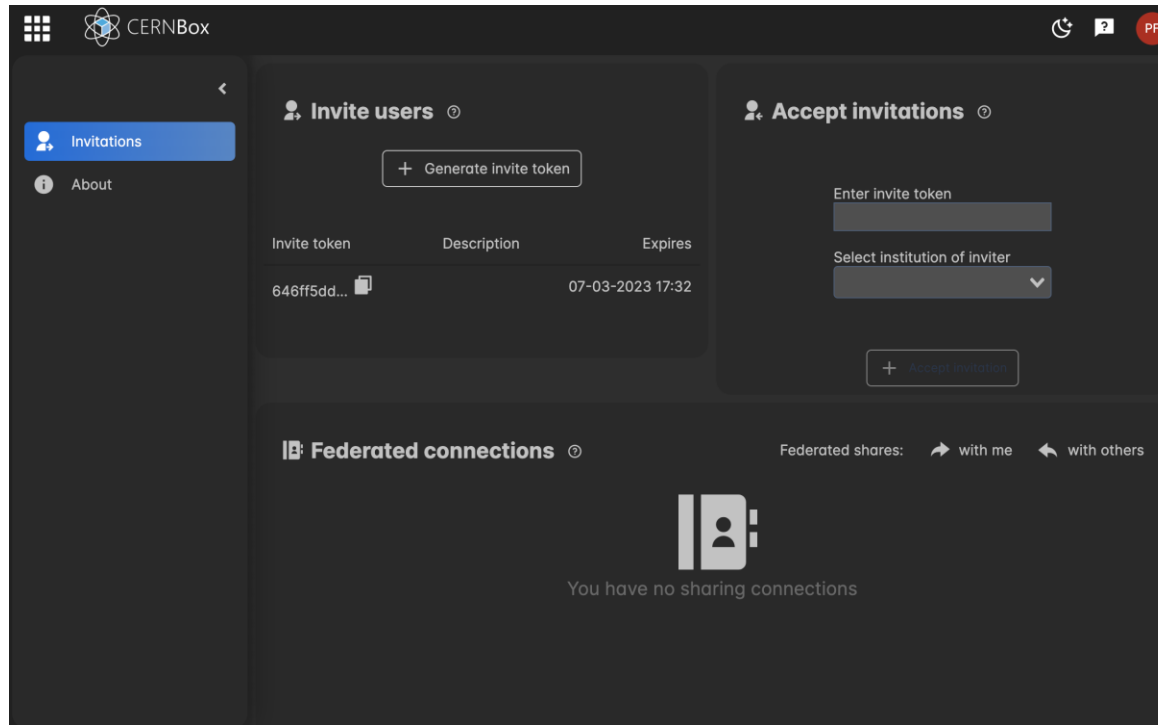
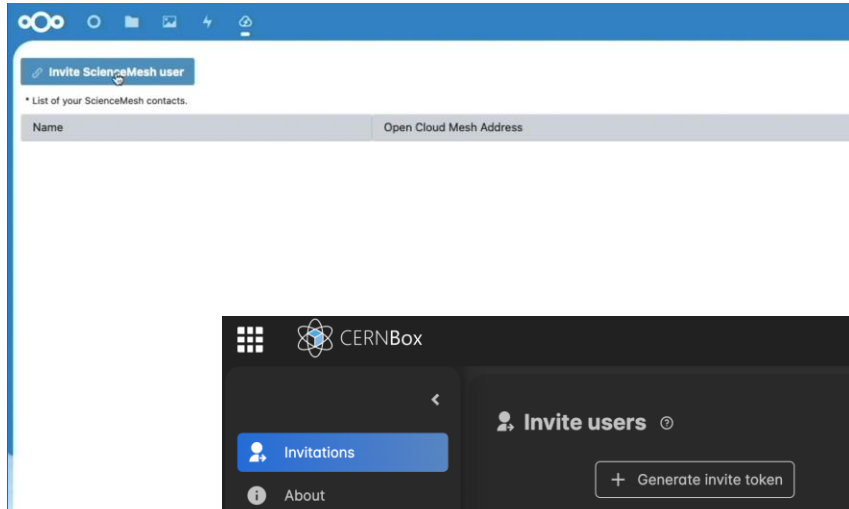


ScienceMesh = OCM + discovery mechanism

... and a few other things, actually



Nextcloud
ownCloud 10
OCIS





[About ScienceMesh](#)

[Contact](#)

Accept an invitation to collaborate from

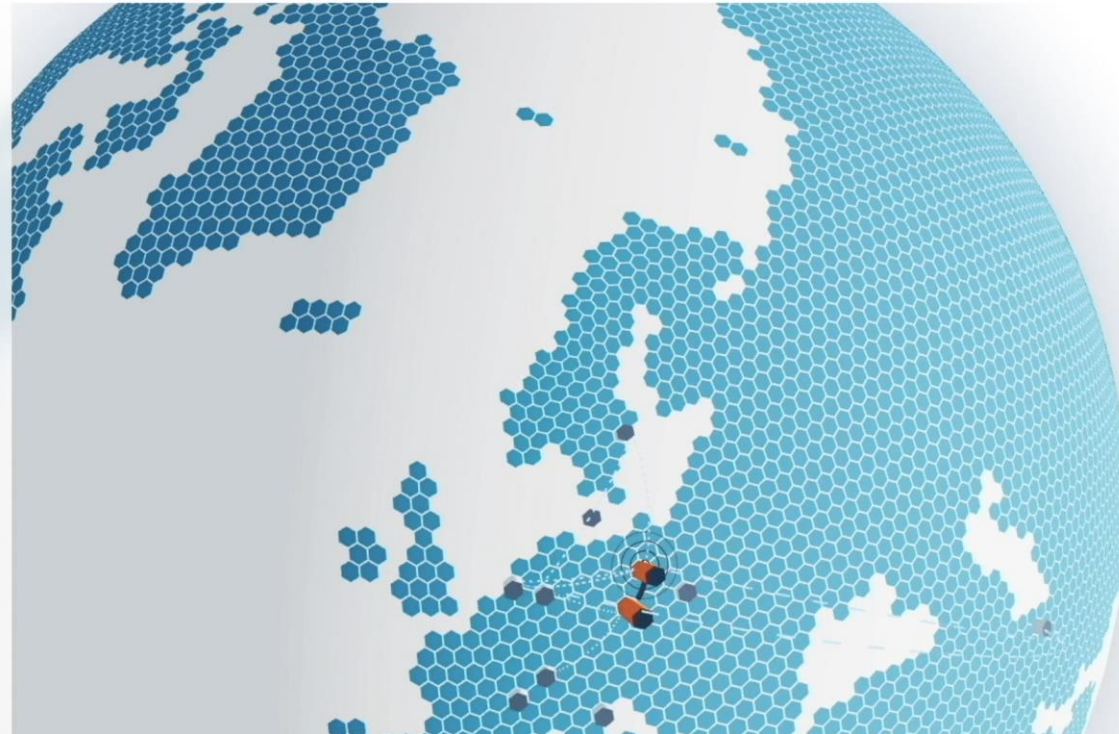
PSNC ScienceMesh Test

using your

CESNET

ScienceMesh site account.

Accept





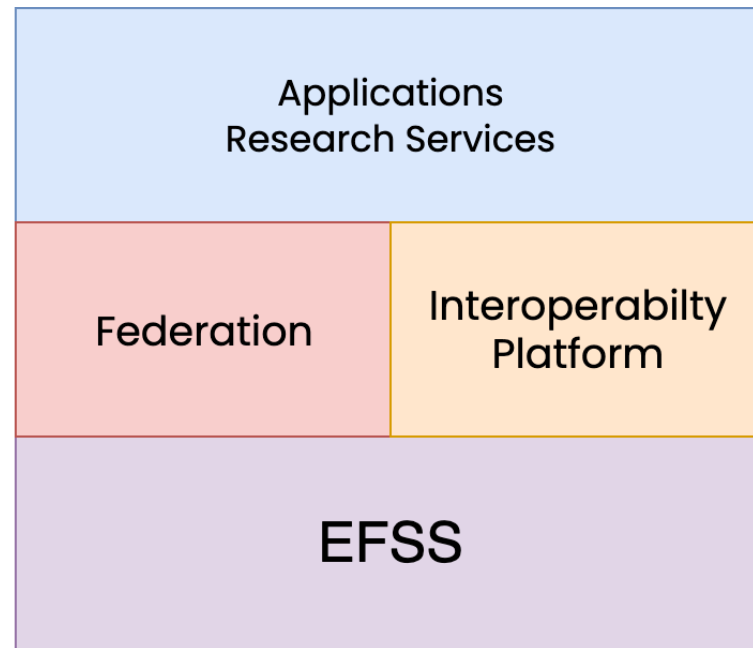
An application platform



New domain-specific applications developed in the community



Build upon existing infrastructure and long-term efforts



OCM, CS3APIs
REVA

ownCloud,
Nextcloud,
Seafile
...

Lightweight add-on
Easy to deploy and install new functionality



Connect to already deployed and commercially supported products





**Science
Mesh**



**Data Science
Environments**



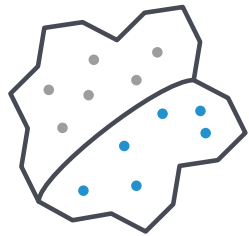
Open Data Systems



**Collaborative
Documents**



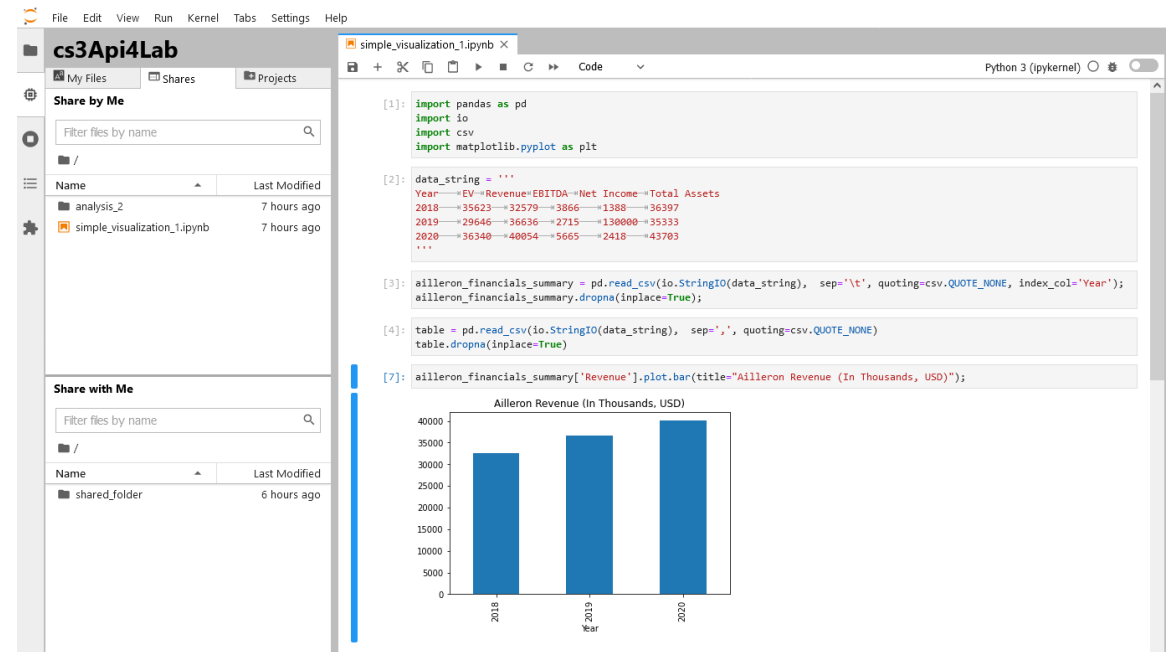
**On demand large
dataset transfer**



Data Science Environment



- # Share notebooks across users
- # Collaborate in data analysis
- # Import federated resources
- # Concurrent editing



The screenshot shows a JupyterLab environment with a file browser on the left and a code editor on the right. The code editor contains the following Python code:

```
[1]: import pandas as pd
import io
import csv
import matplotlib.pyplot as plt

[2]: data_string = '''
Year→EV→Revenue→EBITDA→Net Income→Total Assets
2018→35623→32579→3866→1388→36397
2019→29646→36636→2715→130000→35333
2020→36340→40054→5665→2418→43703
...

[3]: ailleron_financials_summary = pd.read_csv(io.StringIO(data_string), sep='\t', quoting=csv.QUOTE_NONE, index_col='Year');
ailleron_financials_summary.dropna(inplace=True);

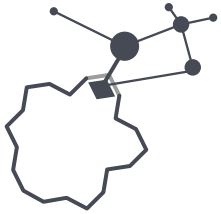
[4]: table = pd.read_csv(io.StringIO(data_string), sep=',', quoting=csv.QUOTE_NONE)
table.dropna(inplace=True)

[7]: ailleron_financials_summary['Revenue'].plot.bar(title="Ailleron Revenue (In Thousands, USD)");
```

The output of the code is a bar chart titled "Ailleron Revenue (In Thousands, USD)" showing revenue for the years 2018, 2019, and 2020. The y-axis ranges from 0 to 40,000. The bars represent revenue values of approximately 35,623 for 2018, 29,646 for 2019, and 36,340 for 2020.



Demo: Marcin



Open Data Workflow

- # Integrated workflow, from creation to publishing
- # Create, collaborate, annotate and publish
- # Generate FAIR data
- # Based on battle-tested tools

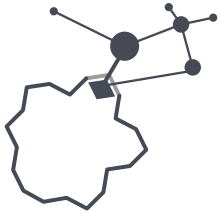


Researcher



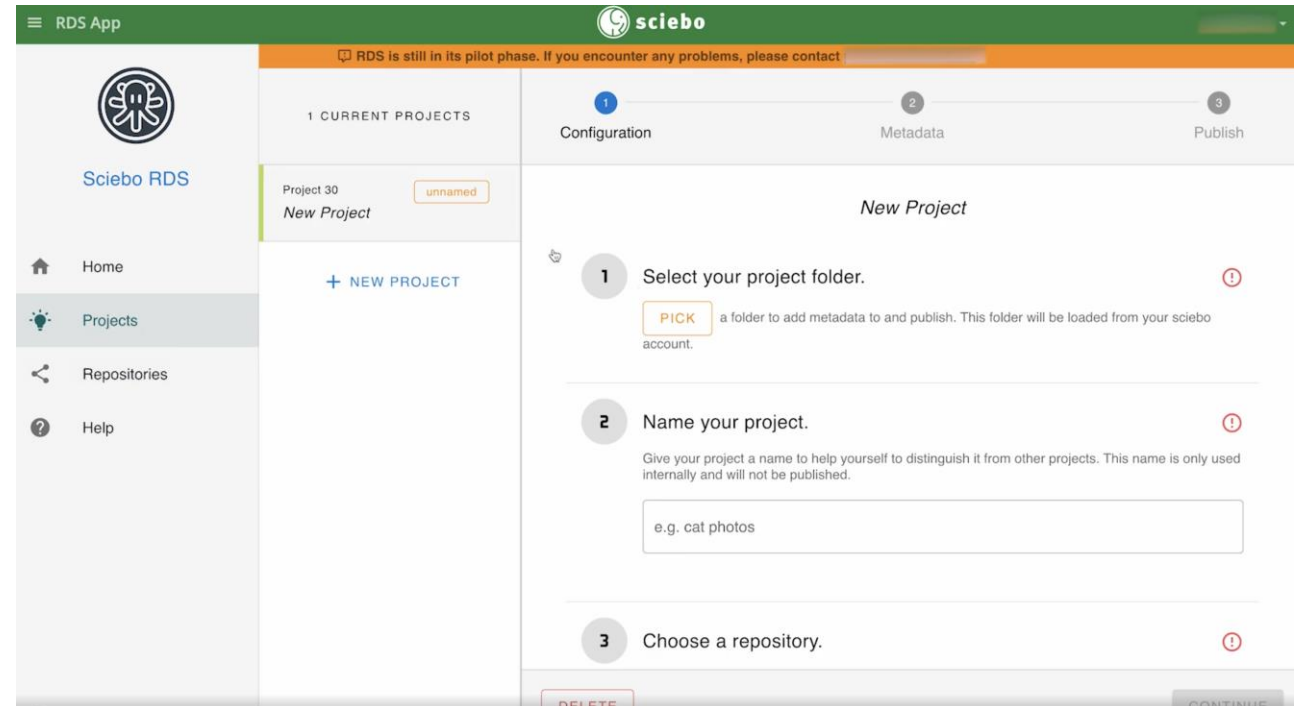
Describo





Open Data Workflow

- # Based on ROCrate
- # Integration with Zenodo, OSF
- # Deployed at WWU, SURF and SUNet

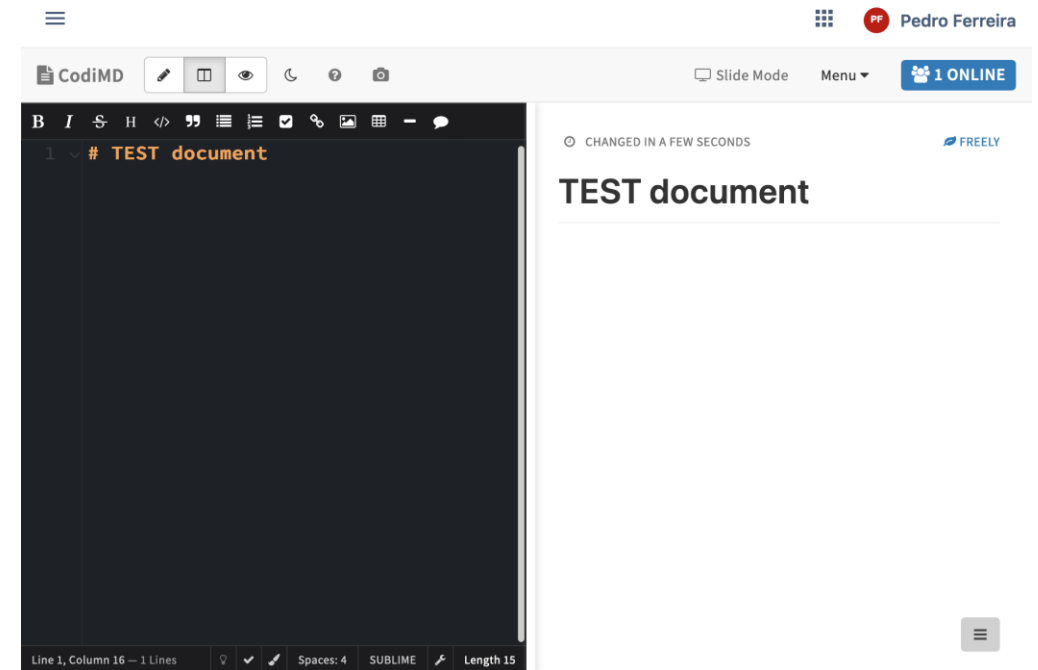


Presentation: Juri, Richard (earlier)

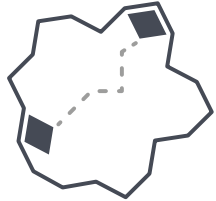


Markdown Editor

- # Open-source product (CodiMD)
- # Collaborative editing within teams
- # EFSS-centric storage of notes
- # Deployed at CERN



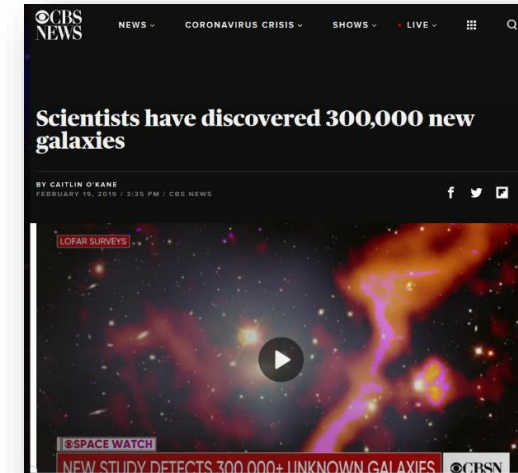
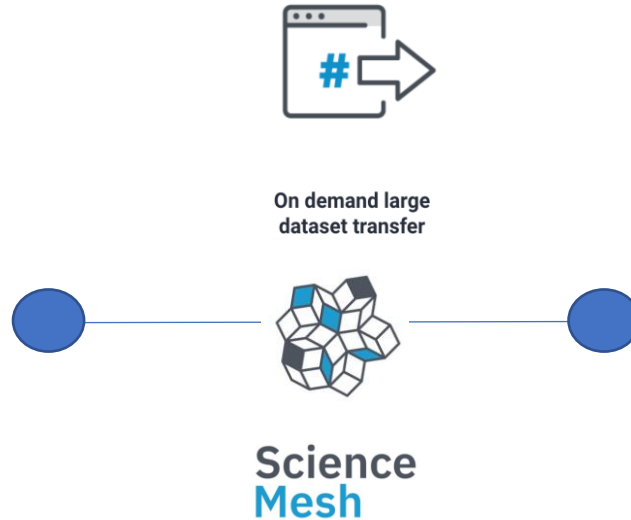
Presentation: Giuseppe (16:30)



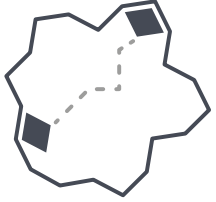
Data Transfers



*Data stored at SURF and FZJ.
Initially processing (64x reduction).*



*Data shipped to Kraków
for creating science quality images*



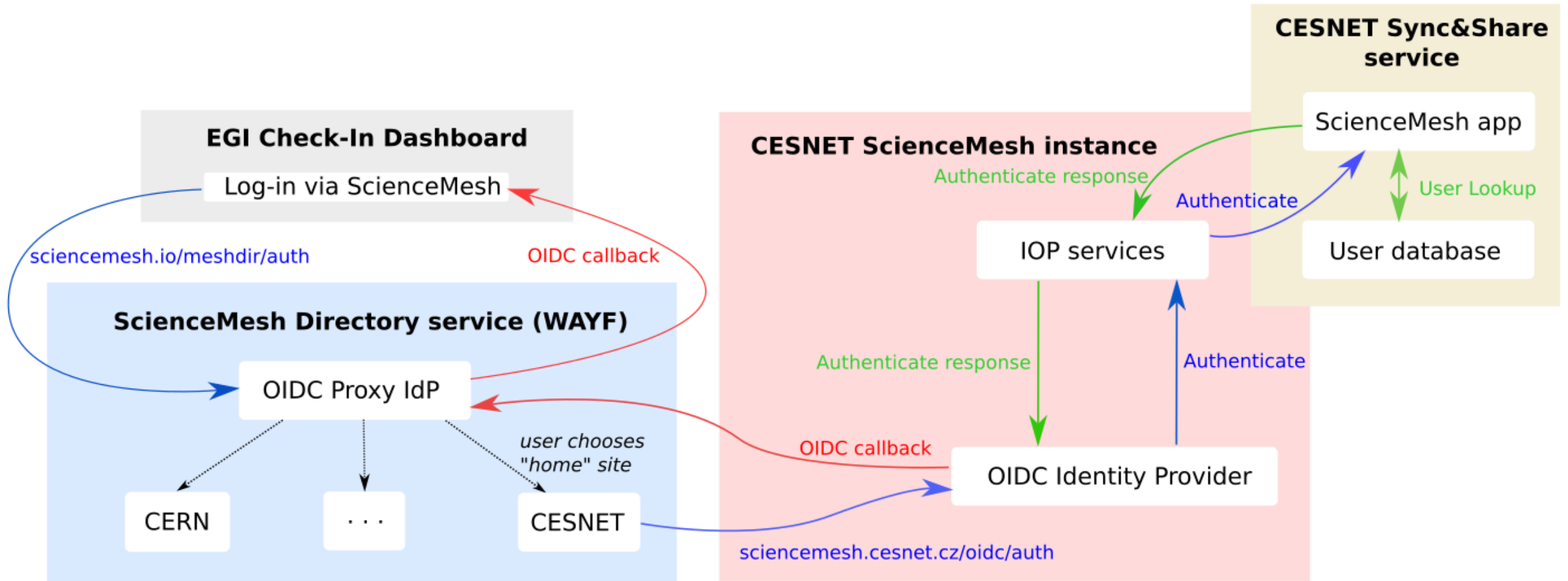
Data Transfers

- # Point to point (Rclone)
 - # PoC successful
 - # User Interface: WIP
- # Between VOs
 - # FTS ↔ Reva: working
 - # Rucio ↔ Reva: WIP



Demo: Ron

A connector of federations



- # Looking into ways of bringing the federated layer into EOSC
- # Providing a service node to researchers with no institutional access
- # Representatives in several TFs
 - # Interoperability: CS3 standards and protocols
 - # Long-term preservation of data
 - # Quality Infrastructure for Research



**EUROPEAN OPEN
SCIENCE CLOUD**

Where are we?

Testbed (8 sites)

- # Cubbit
- # DTU
- # PonderSource
- # PSNC
- # SoftwareMind
- # SUNet
- # SWITCH
- # WWU



Pre-production (3 sites)

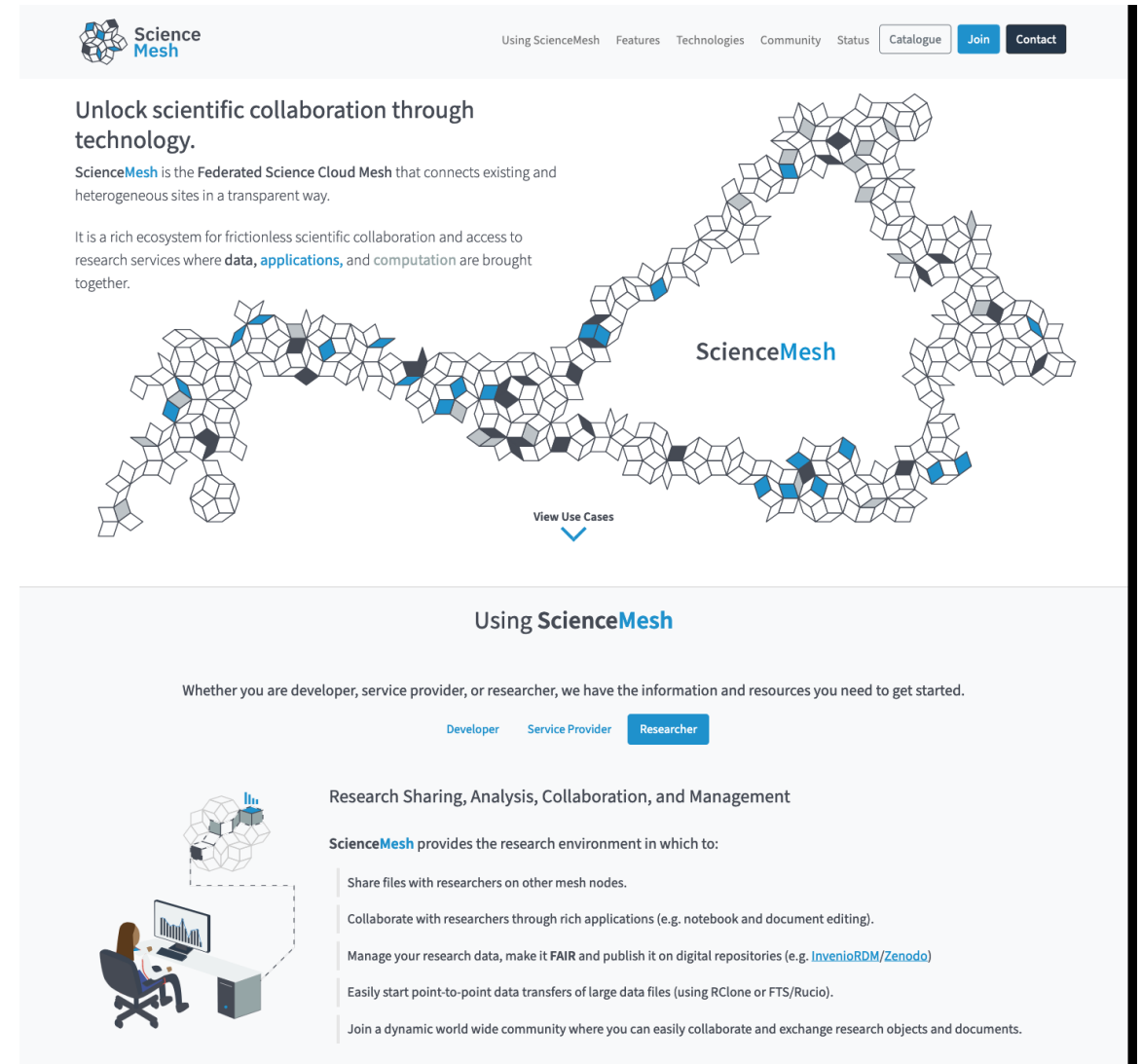
- # **CERN**
- # **CESNET**
- # **SURF**
- # ...

- # Establishing official mesh bodies
- # Perfecting documentation
- # Polishing user interfaces
- # Onboarding more nodes
- # Moving from testbed to QA for remaining nodes
- # **Move to production in Summer**



<https://sciencemesh.io>

- General information about platform
 - *for different audiences*
- Application Catalogue
- Documentation resources
 - *e.g. how to set up?*



The screenshot shows the ScienceMesh website homepage. At the top, there is a navigation bar with the ScienceMesh logo, a search bar, and links for 'Using ScienceMesh', 'Features', 'Technologies', 'Community', 'Status', 'Catalogue', 'Join', and 'Contact'. The main content area features a large graphic of a mesh structure forming a circular shape, with the text 'ScienceMesh' in the center. Below the graphic is a 'View Use Cases' button. The text on the page reads: 'Unlock scientific collaboration through technology. ScienceMesh is the Federated Science Cloud Mesh that connects existing and heterogeneous sites in a transparent way. It is a rich ecosystem for frictionless scientific collaboration and access to research services where data, applications, and computation are brought together.'

Using ScienceMesh

Whether you are developer, service provider, or researcher, we have the information and resources you need to get started.

Developer Service Provider **Researcher**

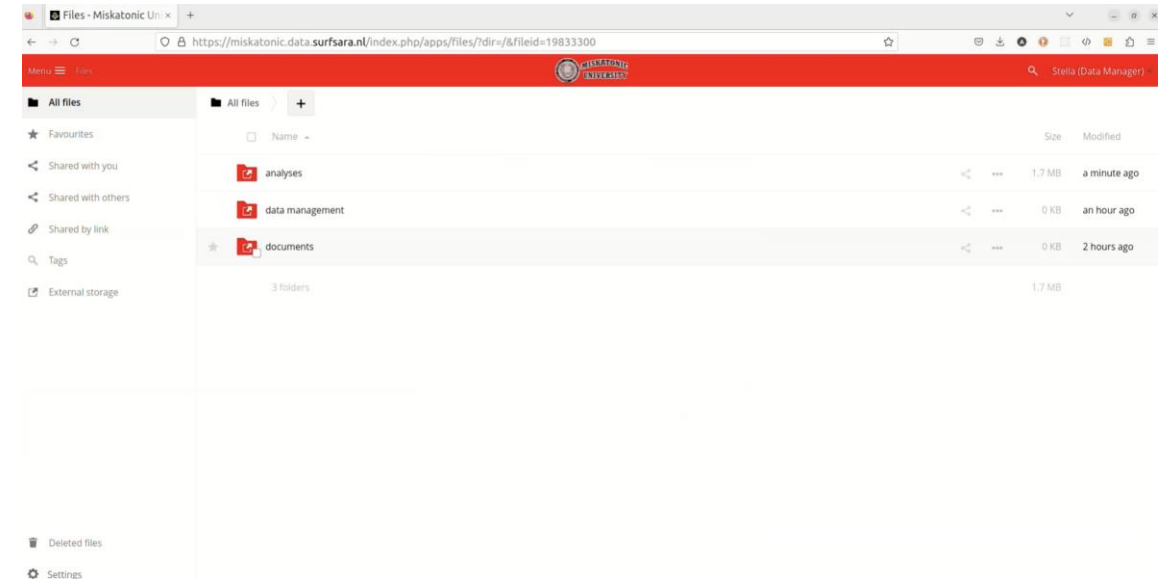
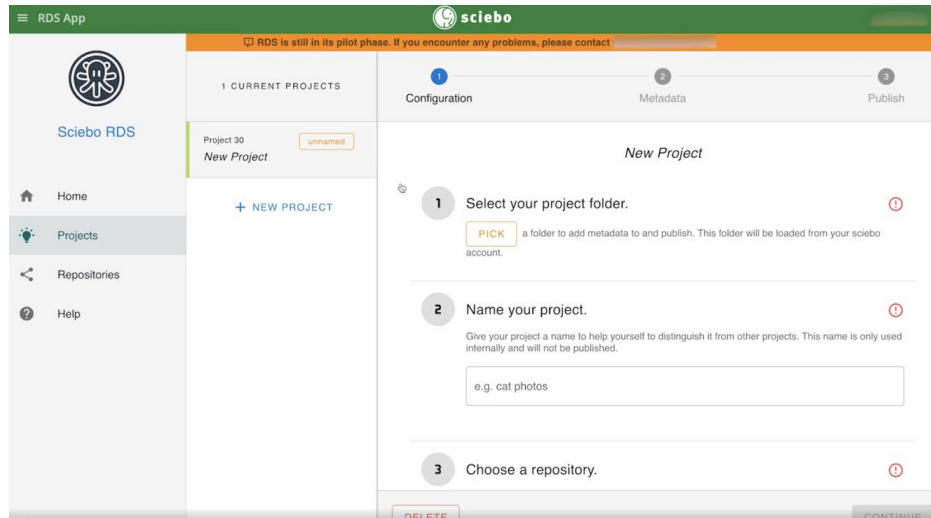
Research Sharing, Analysis, Collaboration, and Management

ScienceMesh provides the research environment in which to:

- Share files with researchers on other mesh nodes.
- Collaborate with researchers through rich applications (e.g. notebook and document editing).
- Manage your research data, make it FAIR and publish it on digital repositories (e.g. [InvenioRDM/Zenodo](#))
- Easily start point-to-point data transfers of large data files (using RClone or FTS/Rucio).
- Join a dynamic world wide community where you can easily collaborate and exchange research objects and documents.

- # 3.5 years of Project now reaching the end
- # Lots of new developments – usable interfaces, deployable applications...
- # Applications for Nextcloud and ownCloud (10 and OCIS)
- # 11 nodes (2 outside the consortium), more on the way!
- # Already usable through some of the QA setups
- # Aiming at production by Summer (end of Project)
- # **Join the session in the afternoon for more information!**

Later Today!





<https://sciencemesh.io>

<https://gitter.im/sciencemesh/community>

<https://github.com/sciencemesh>



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Thank you!
Discover more on...

 cs3mesh4eosc.eu

 [company/cs3mesh4eosc](https://www.linkedin.com/company/cs3mesh4eosc)

 [@cs3mesh4eosc](https://twitter.com/cs3mesh4eosc)



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Icons:

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