



**CS³
MESH⁴
EOSC**

Connecting European Data



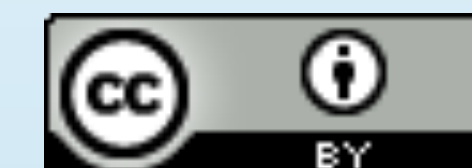
ScienceMesh: CS3 Community Fabric

Jakub T. Mościcki(CERN)

CS3 2024, March 13



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



ScienceMesh: Interactive and Agile/Responsive Mesh of Storage, Data and Applications for EOSC

Prototyping new and innovative services for EOSC

EU Horizon 2020 Project: Excellent Science

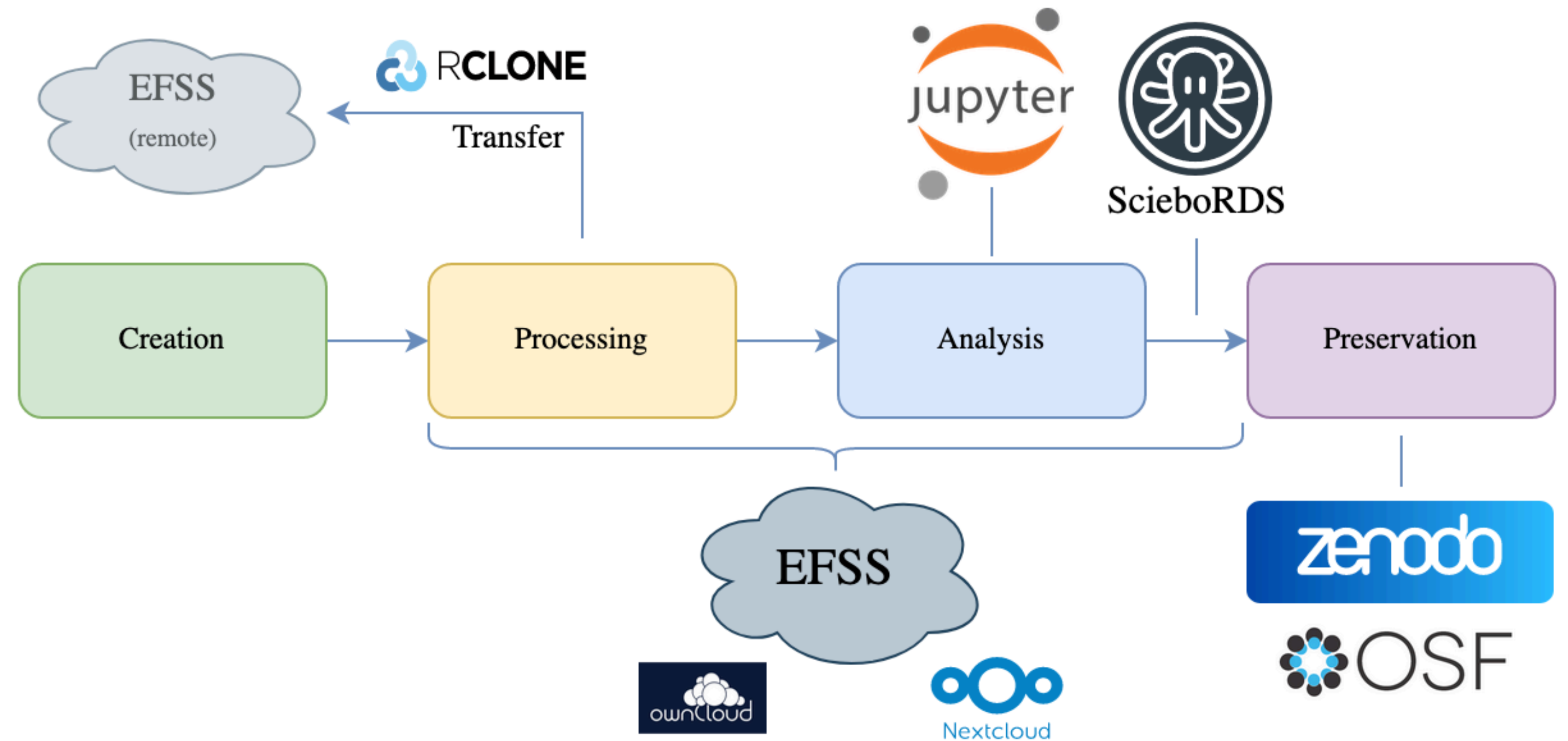
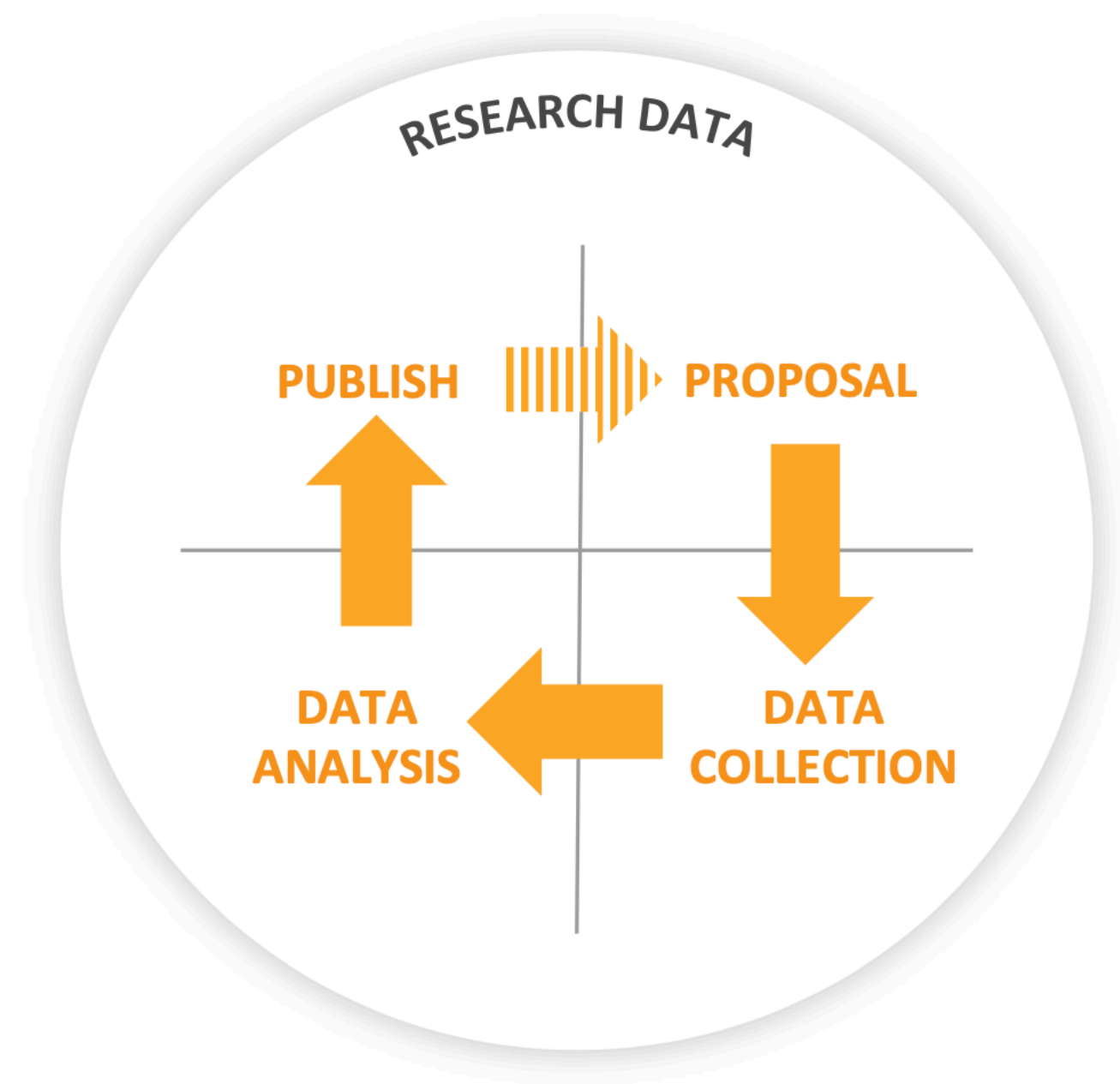
January 2020 - June 2023 (42 months)

13 Partners

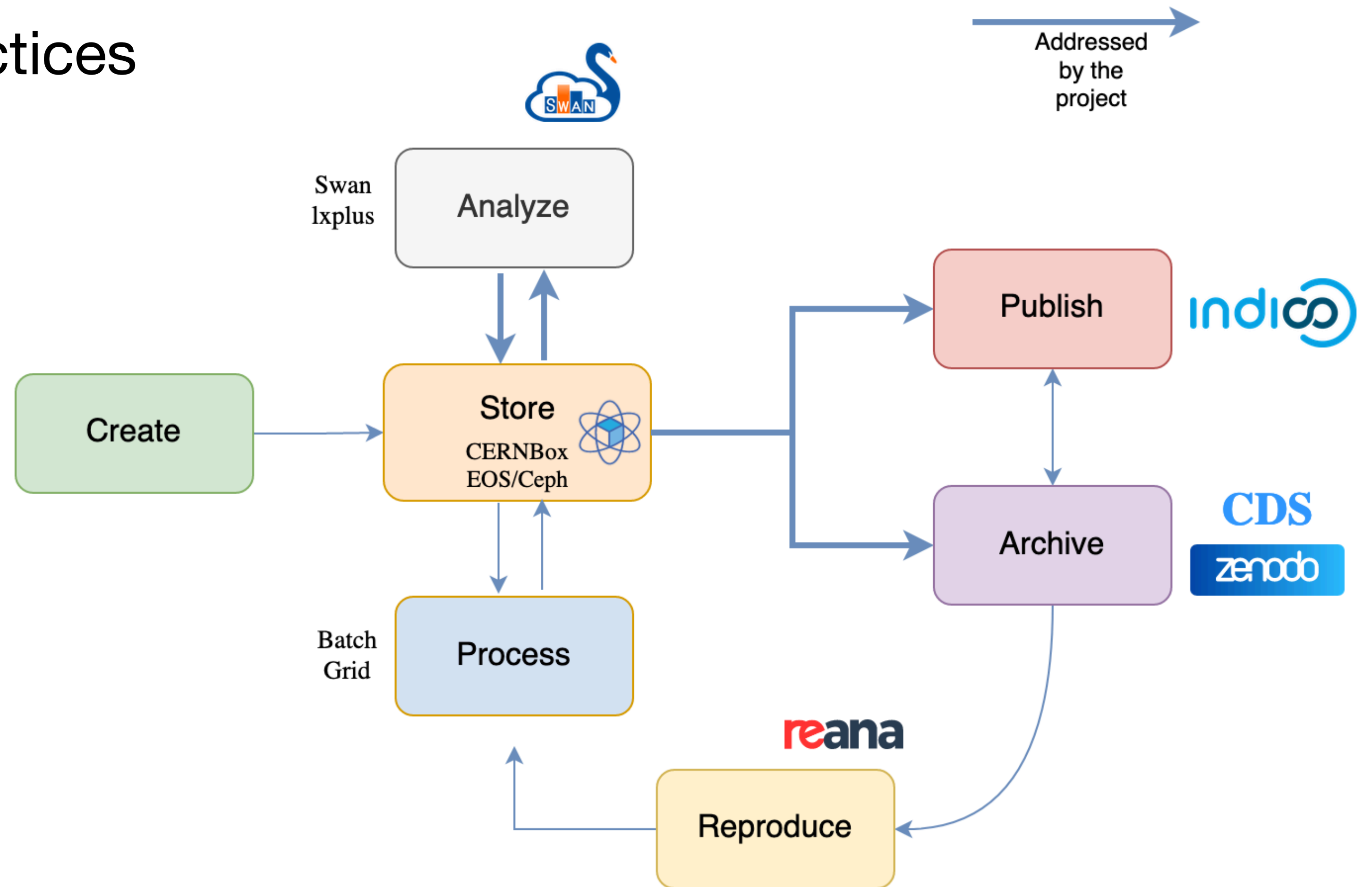
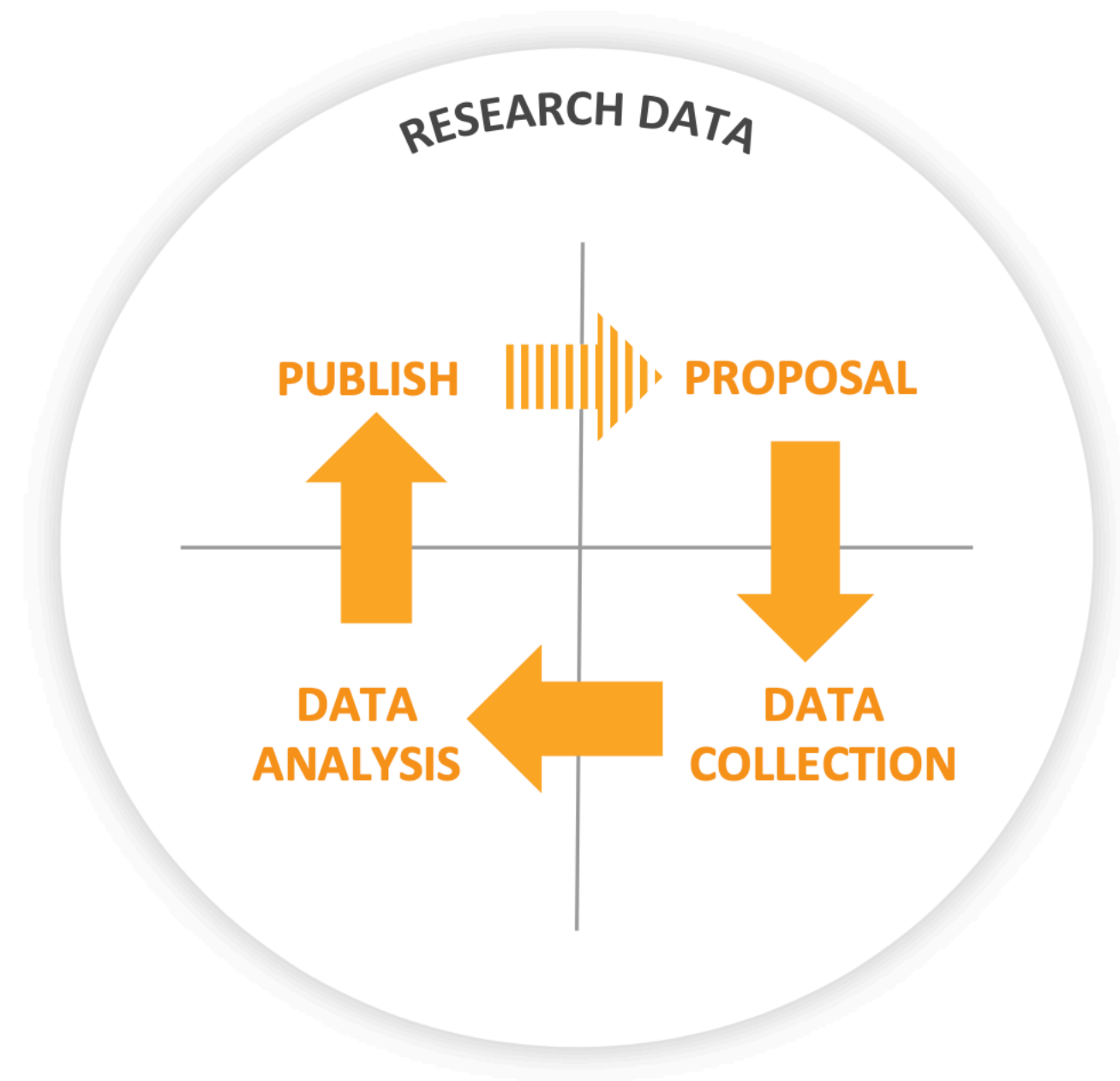
cs3mesh4eosc.eu
sciencemesh.io



- Facilitate and optimize the research data lifecycle workflow
- Encourage FAIR data practices



- Facilitate and optimize the research data lifecycle workflow
- Encourage FAIR data practices



Science Mesh

Global Impact

New capability: *interoperable, pan-European federation of data and research services*

- allow friction-free collaboration between all European researchers
- without requiring these researches to relocate their data
- supporting FAIR research data lifecycle workflow, from analysis to publication



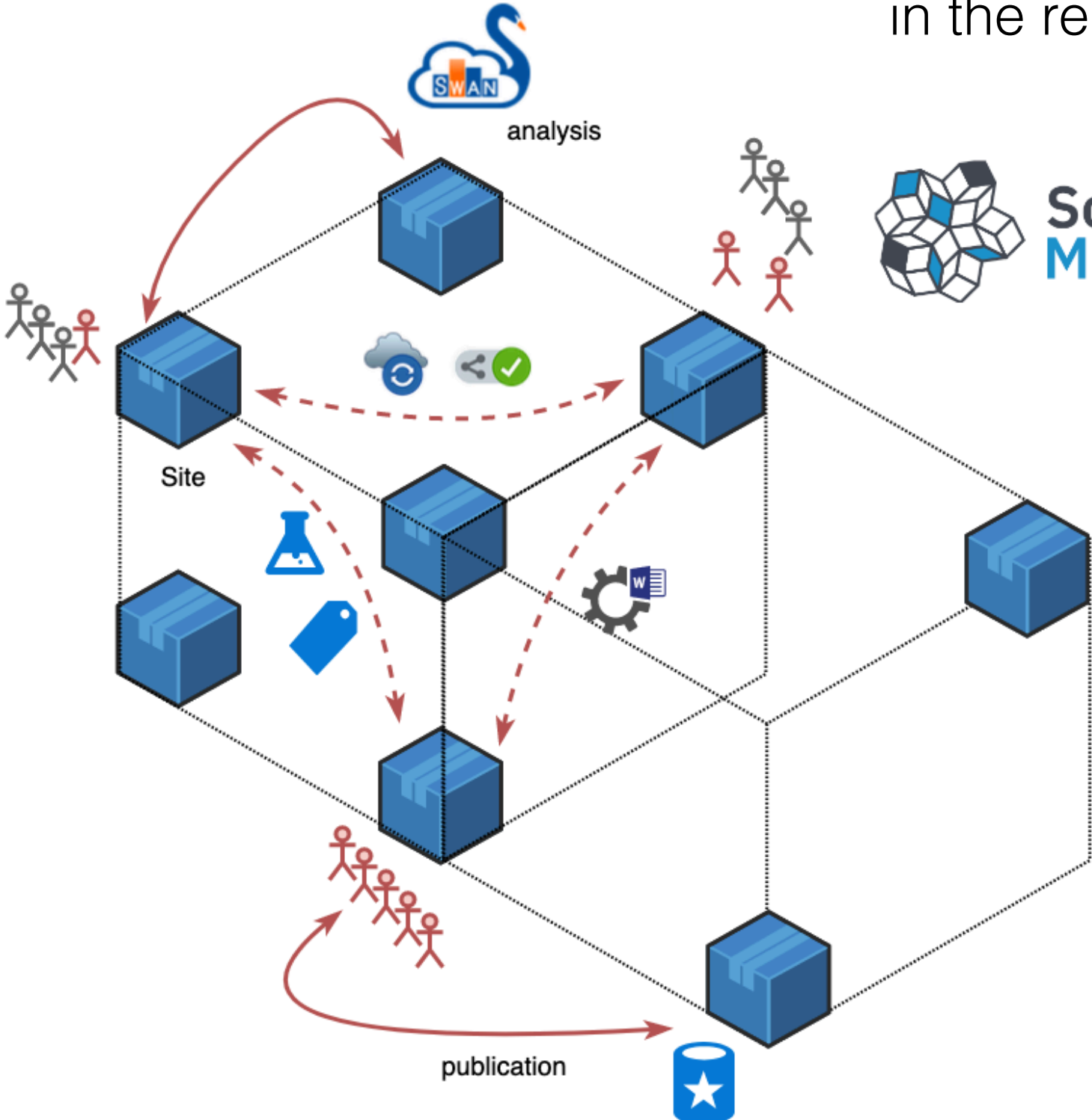
<https://sciencemesh.io>

One-click to create user groups, share projects and data



Domestic and remote users in the same collaborative workflow.

Application&data workflow.



Full metadata awareness in the research workflow.



Compute

Integrate distributed computing capabilities with data sharing systems.



- # **Reduce fragmentation and data silos of the European Research**
 - # **Easier collaboration on data products** between researchers, scientists and users across existing boundaries (institution, infrastructure, country,...)
 - # **More productive research workflows** interconnecting storage, compute and applications, encourage data reuse, sharing and FAIR metadata practices during the entire data lifecycle
- # **Prototype a service that could be offered as a part of global EOSC platform**
 - # No need to export or move data to access functionality
 - # No need to resort to hyper scalers for a common service stratum between organisations

Capture the momentum generated by community work on innovative services based on Sync&Share storage

Sync: data available on all devices, inside and outside of the data center

Share: data accessible between users and user groups

European EFSS Industry (Enterprise File Sync and Share)

Owncloud, Nextcloud, ...

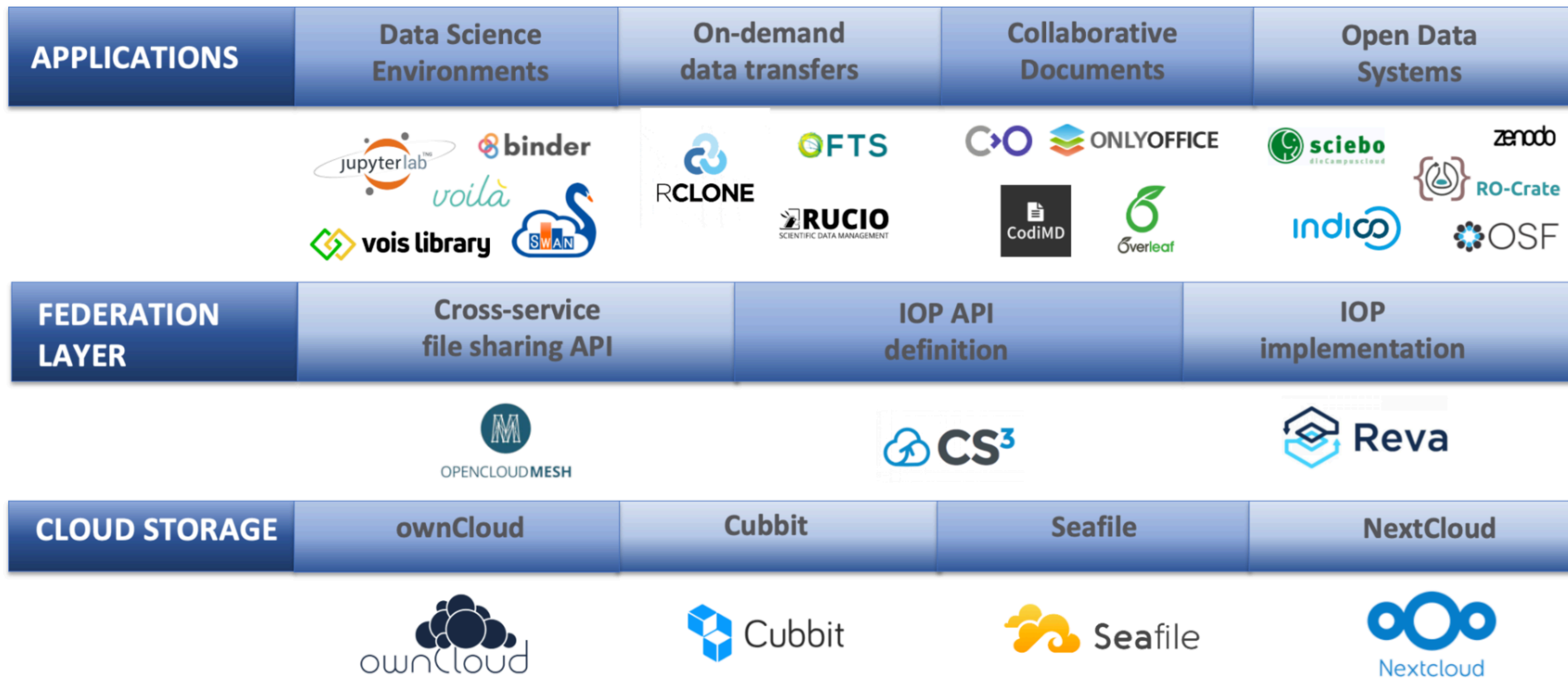


Research and Edu Community

CS3 (cs3community.org)

EGI, WLCG, HIFIS, cluster projects (ESCAPE,...)





- # Innovate *and* re-use and leverage on the existing elements as much as possible
- # Define the interoperability framework
 - # OCM, WOPI, RO-CRATE, CS3APIs, RCLONE, ...
- # Support the development of interoperability protocols within the CS3 community
 - # OCM version 1.1 [released]
- # Engage with the developers of EFSS products
 - # ScienceMeshApp for OC10, OCIS and NC27 [in the marketplace, beta]
- # Prototype with research services without overbuilding functionality
 - # Jupyter/SWAN/Dashboards [production at CERN, JRC, prototype at PSNC]
 - # ScieboRDS/InvenioRDM [deployment at WWU, SURF and SUNET]
 - # Collabora/OnlyOffice/MS365 [production]
 - # RCLONE/FTS [demonstrator]
 - # RUCIO + Jupyter [demonstrator], Indico + CERNBox [production]

Outlining governance and policy model for the future federation

The ScienceMesh Policy Framework defines the basic operational procedures and is made of the following documents:

1. ScienceMesh Site Admission Procedure⁷⁶
2. ScienceMesh Site Exit Procedure⁷⁷
3. ScienceMesh Site Suspension Procedure⁷⁸
4. ScienceMesh Support Procedure⁷⁹
5. ScienceMesh Policy Framework Constitution⁸⁰
6. ScienceMesh Declaration⁸¹
7. ScienceMesh Glossary⁸²

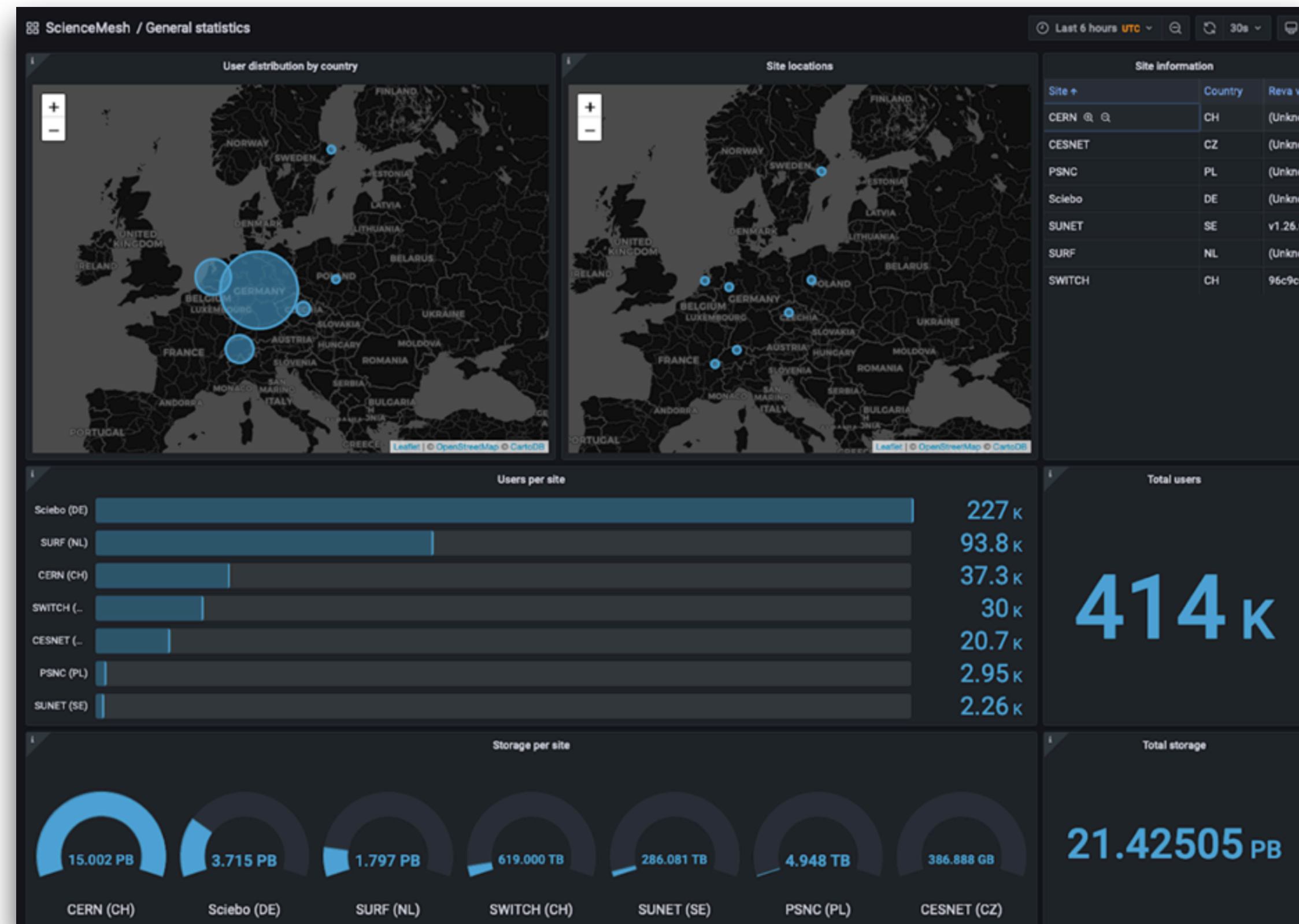
Consulted with legal services of three project partners and Chief Regulatory Advisor at Jisc, UK

ScienceMesh Constitution signed by one site so far

- # Federation: developing a sustainable architecture blueprint and reference implementation
 - # autonomous distributed operation with no critical central dependencies
 - # minimal central components, reusing existing services (GOCDB, Prometheus,...)
 - # Invitation Workflow: no dependency on federated AAI
 - # create the basis to move on to production as a part of the steady-state activity beyond the project's end
- # REVA + CS3APIs as a Interoperability Platform (IOP)

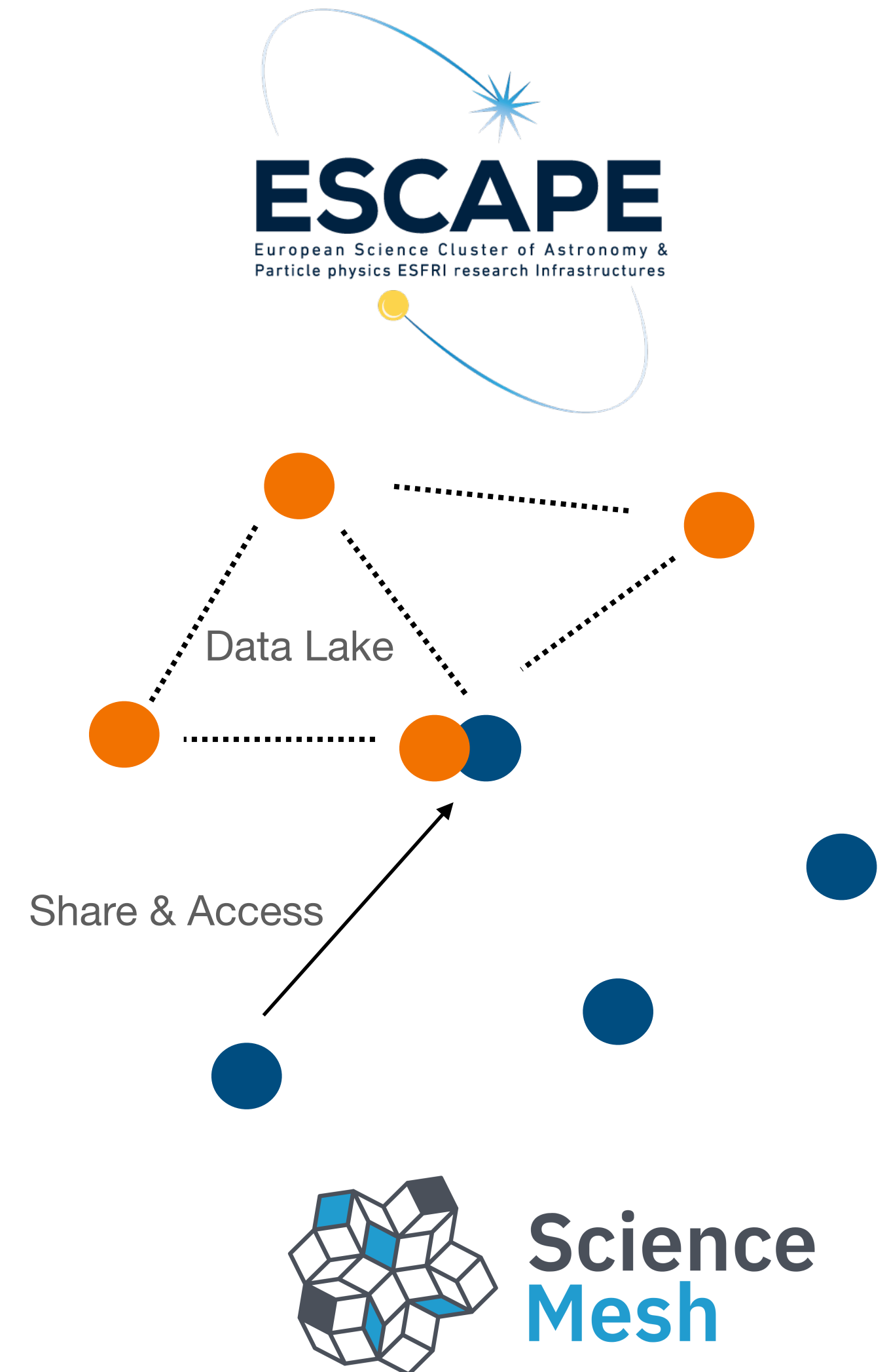
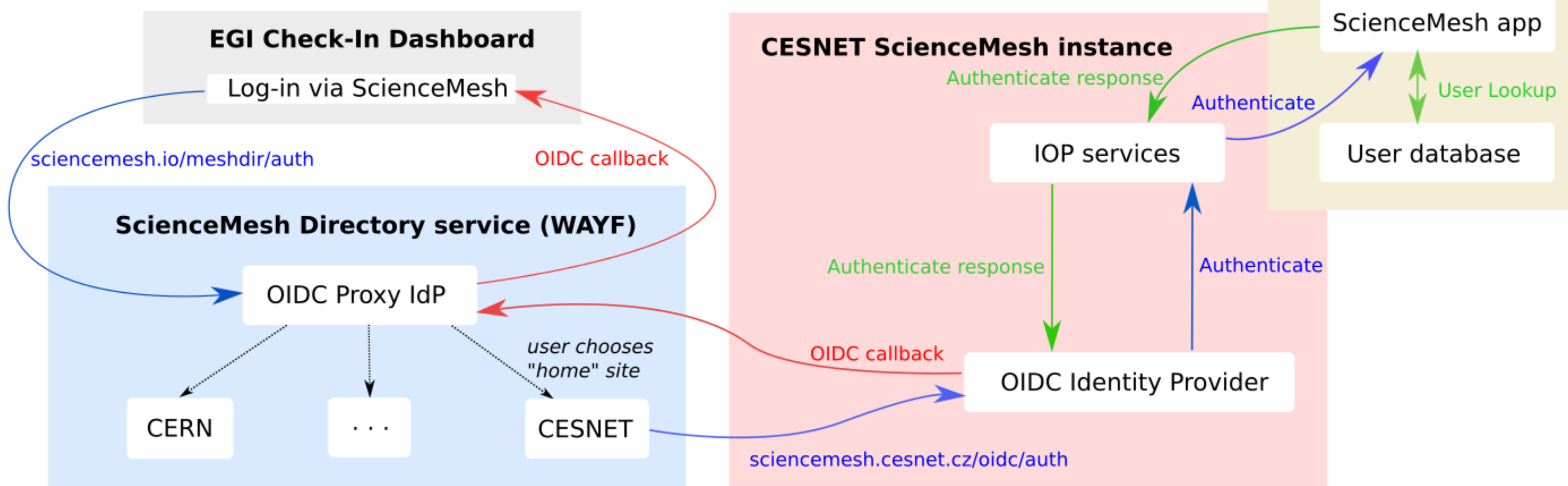
Federation testbed [pre-prod]

CERN, CESNET, SUNET, SURF, SWITCH, WWU, PSNC
+ AILLERON, Pondersource



Test drive with user communities

- # High-Energy Physics, Earth Observation, Social Sciences, Research & Classroom, Astrophysics, ...
- # Focused on vertical integration components
- # Horizontal federation testing requires production status



Technical

Onboarding of new sites tends to be difficult

- # High technical mark to deploy the services (k8s, IOP, ...) /problematic for some sites/
- # Deployment not fully “commoditised” (documentation, automation)

Evolution of EFSS FOSS market & products

Governance & policy

Hosting “container” organization is missing

Can some EOSC Core services be used to support the federation?

Support & Funding

Some bridging funding available for OCM and to lowering technical entry barrier for ScienceMeshApp

Longer term?

- # Interest from CS3 community actors to pursue activity areas of ScienceMesh?
- # Discussed focus areas — activity streams
 - # Horizontal federation to interconnect sites and EOSC EU Node
 - # Vertical integration of large-scale research service environments and Research Infrastructures (VREs, Analysis Facilities, HPC integration)
- # Interest to understand if and how this technology may play role beyond EOSC: Data Spaces (commercial market for EFSS) + SIMPL ?

Backup Slides

3 Dimensions

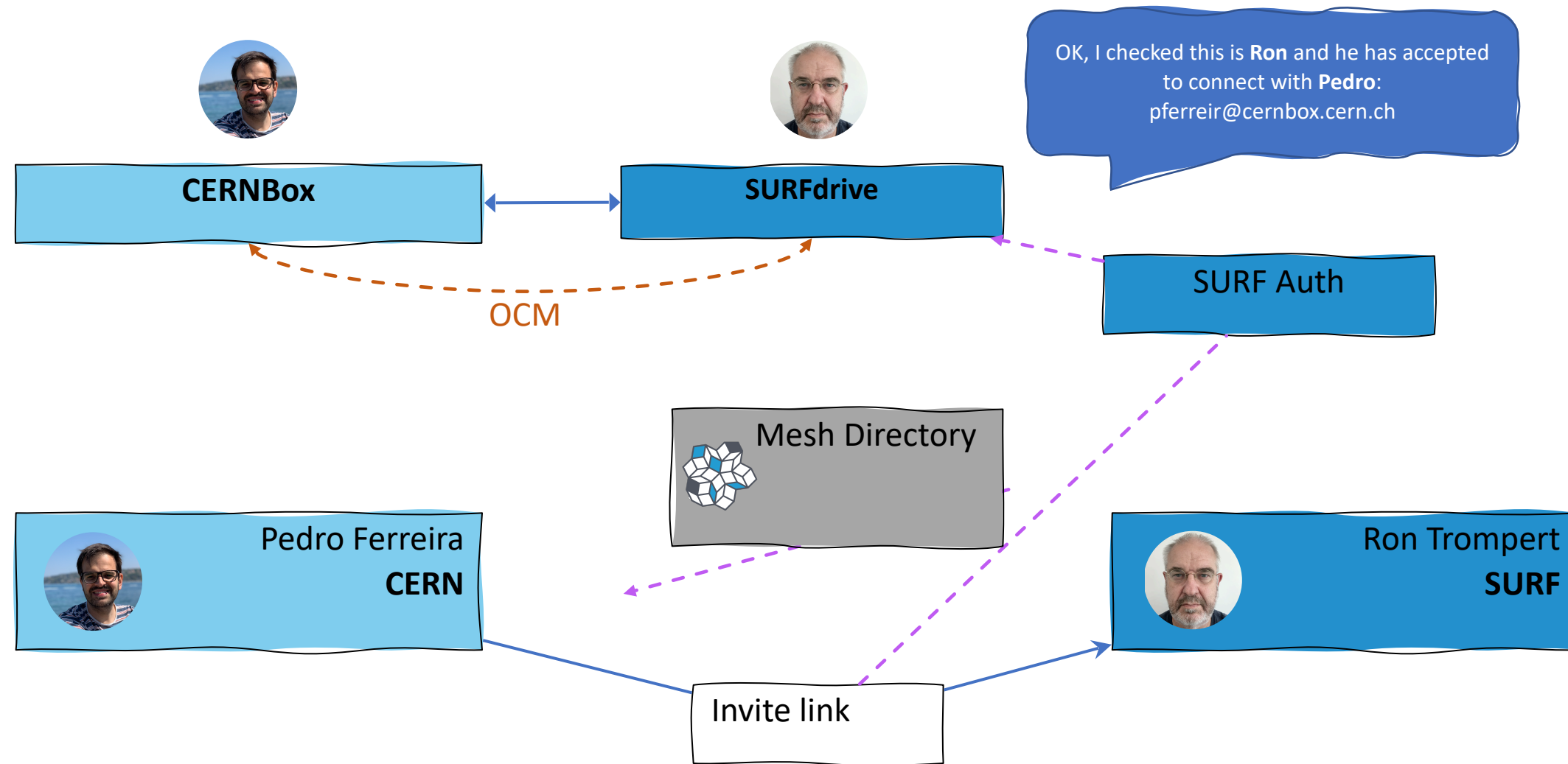
Trust-based federation

Application Platform

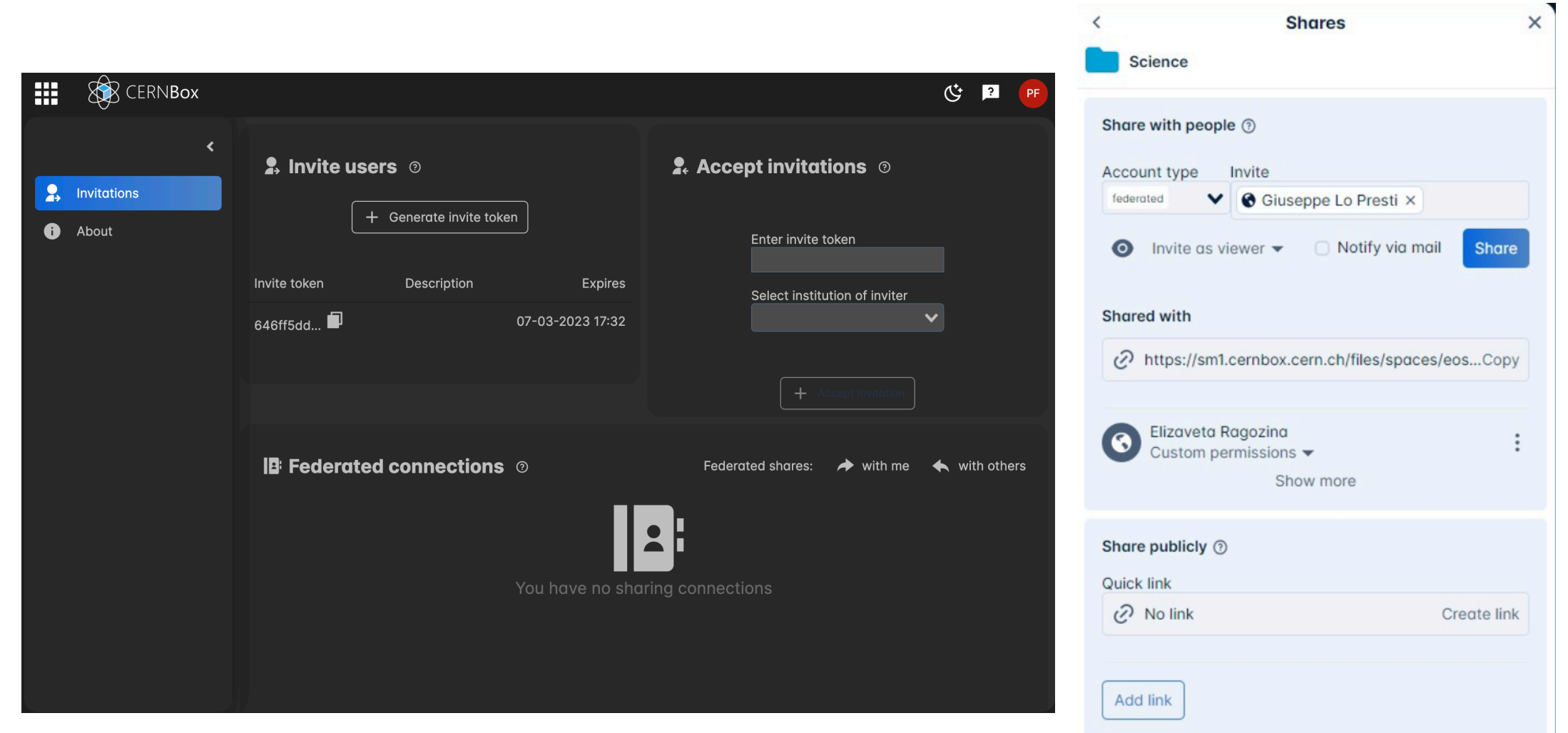
Connector of infrastructures



Science
Mesh



Nextcloud
ownCloud 10
OCIS



The top screenshot shows the CERNBox 'Invitations' interface. It has tabs for 'Invitations' and 'About'. Under 'Invitations', there is a 'Generate invite token' button and a table with columns 'Invite token', 'Description', and 'Expires'. One token is listed: '646ff5dd...' with an expiration of '07-03-2023 17:32'. To the right, the 'Accept invitations' section has a text input for 'Enter invite token', a dropdown for 'Select institution of inviter', and a '+ Accept invitation' button. Below this is the 'Federated connections' section, which currently shows 'You have no sharing connections'.

The bottom screenshot shows the 'Shares' interface for a folder named 'Science'. It includes a 'Share with people' section with 'Account type' set to 'Invited' and 'Invited by' as 'Giuseppe Lo Presti'. There are options for 'Invite as viewer' and 'Notify via mail', and a 'Share' button. Below this is the 'Shared with' section, showing a link 'https://sm1.cernbox.cern.ch/files/spaces/eos... Copy' and a user 'Elizaveta Ragozina' with 'Custom permissions'. The 'Share publicly' section has a 'Quick link' set to 'No link' and a 'Create link' button.

Science Mesh DIRECTORY

About ScienceMesh Contact

Accept an invitation to collaborate from
PSNC ScienceMesh Test
using your
CESNET
ScienceMesh site account.
Accept



Science Mesh

