

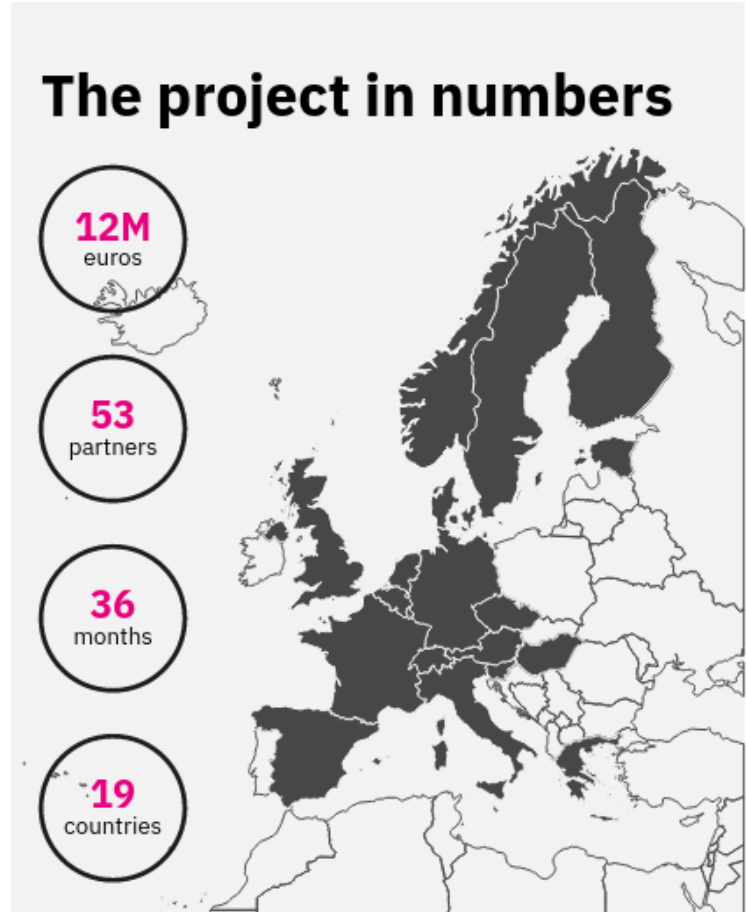
By-COVID & IO-SEA

Cryo-electron microscopy and tomography core facility CEITEC MU

Jiri Novacek

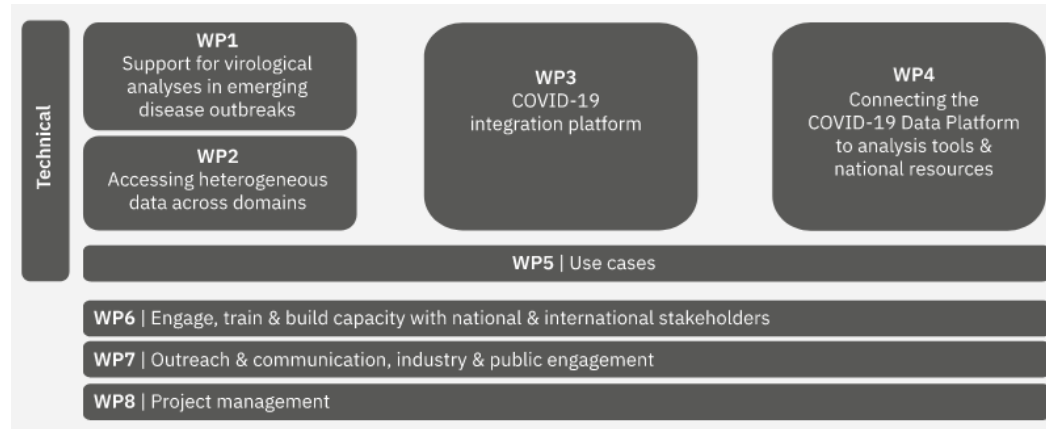
By-COVID (BeYond-COVID)

- HORIZON-INFRA-2021-EMERGENCY-01 call
- started - 13th October 2021
- lead partner - Elixir
- participation through RI (Instruct-ERIC)
- spanning across medical and life-science research areas
- goals:
 - make covid-19 data accessible to everyone
 - set up framework for making data from other infection diseases open and accessible



By-COVID (BeYond-COVID)

- data generation is NOT the primary objective
- alignment with external projects focussing on data generation (ISIDORe)
- objectives:
 - mobilising data (raw data)
 - connecting data
 - standardising data (FAIRification)
 - exposing and analysing data
- covid-19 data platform
(originally established by EMBL-EBI)

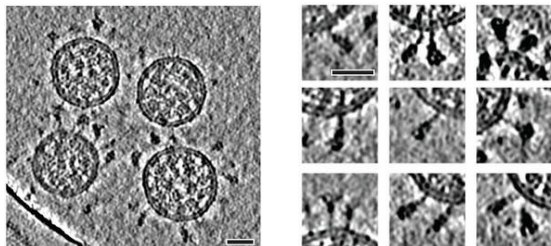


By-COVID (BeYond-COVID)

- experience
 - large consortium
 - direction primarily determined by the lead partner
 - topics and sub-projects need to be pre-discussed within the infrastructure consortium
 - limited number of resources for actual development/research
 - overview of data management strategies and state-of-the-art in other domains

Motivation

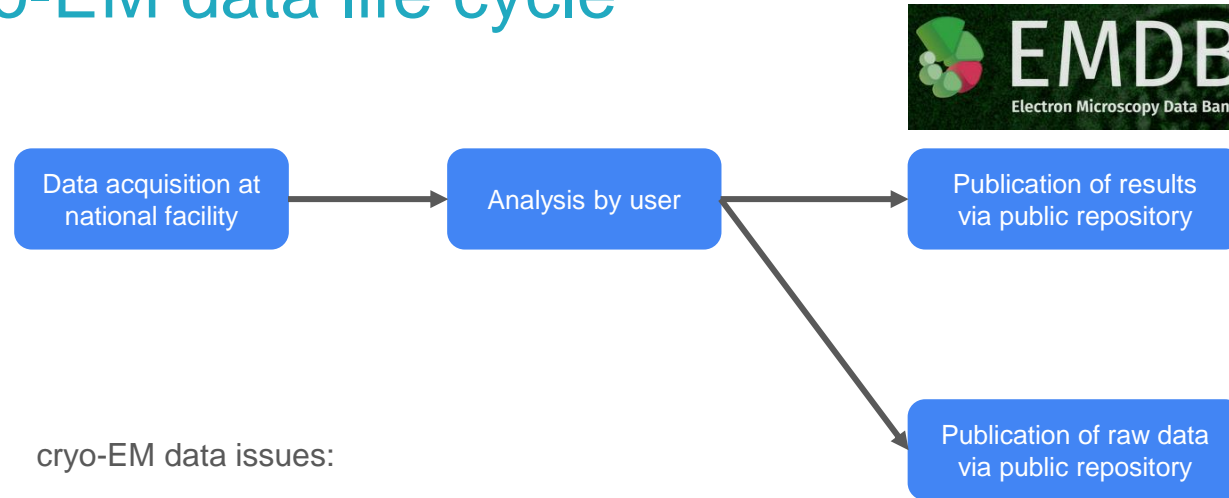
- Field of study - structural biology using cryo-electron microscopy



Turonova et al. (2020) Science

Continent	cryoEM maps and supporting data	
	EMDB maps (entries)	EMDB maps supported by EMPIAR data
Europe and Europe-led international cooperations	94	14 (15%)
North America and North America -led international cooperations	159	5 (3%)
China and China-led international cooperations	70	0 (0%)
TOTAL (as March 19th, 2021)	323	19 (6 %)

Cryo-EM data life cycle

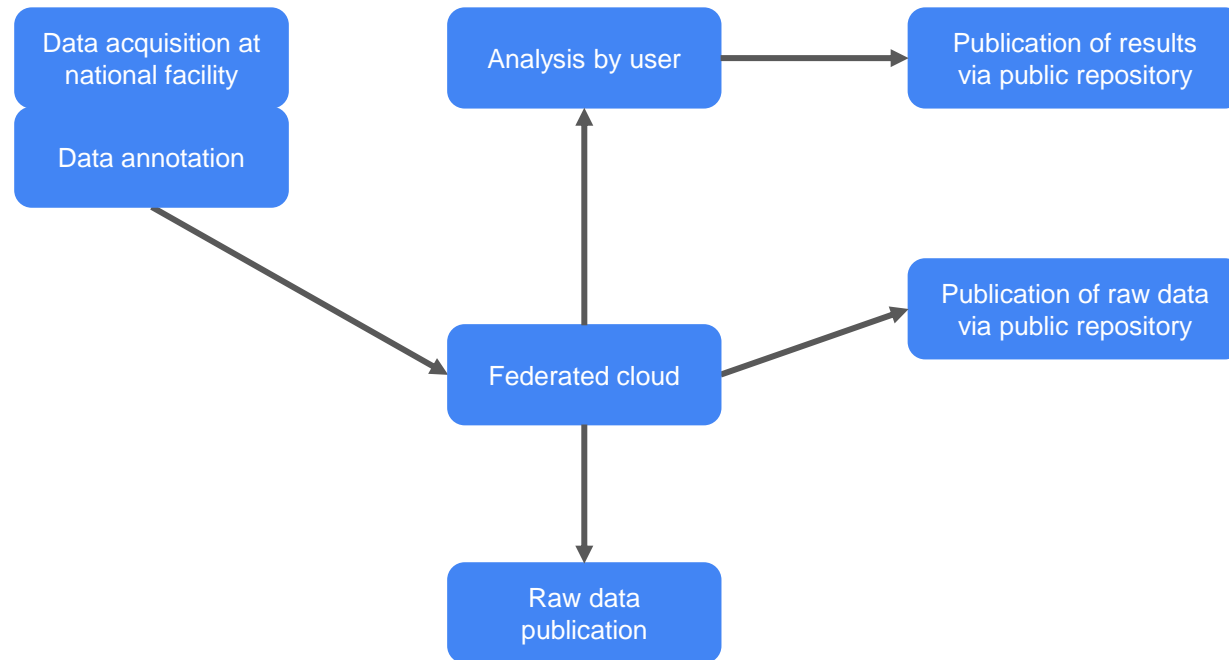


cryo-EM data issues:

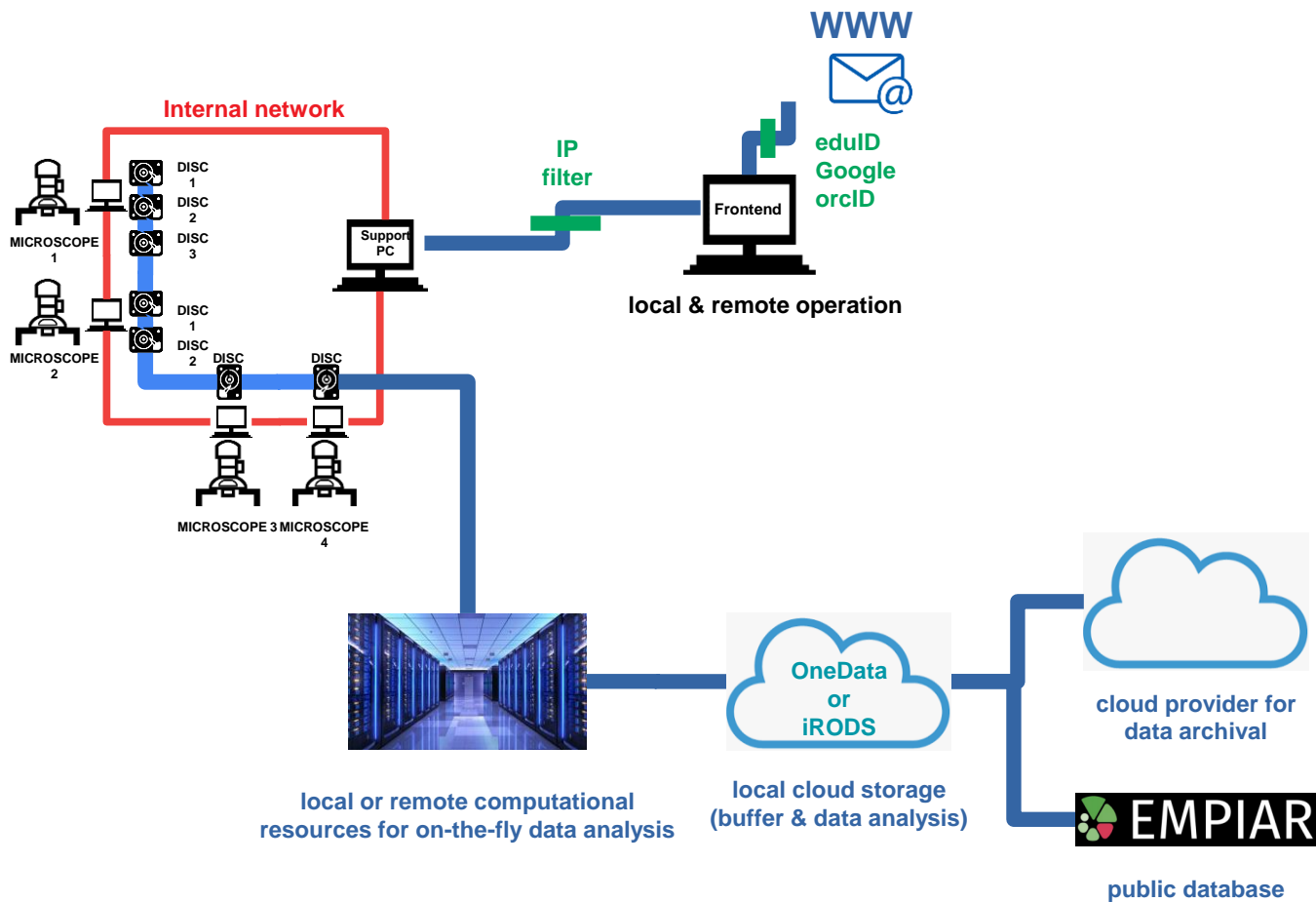
- large raw data (~2TB/dataset)
- annotation
- deposition to public database requires existing deposition of data analysis results



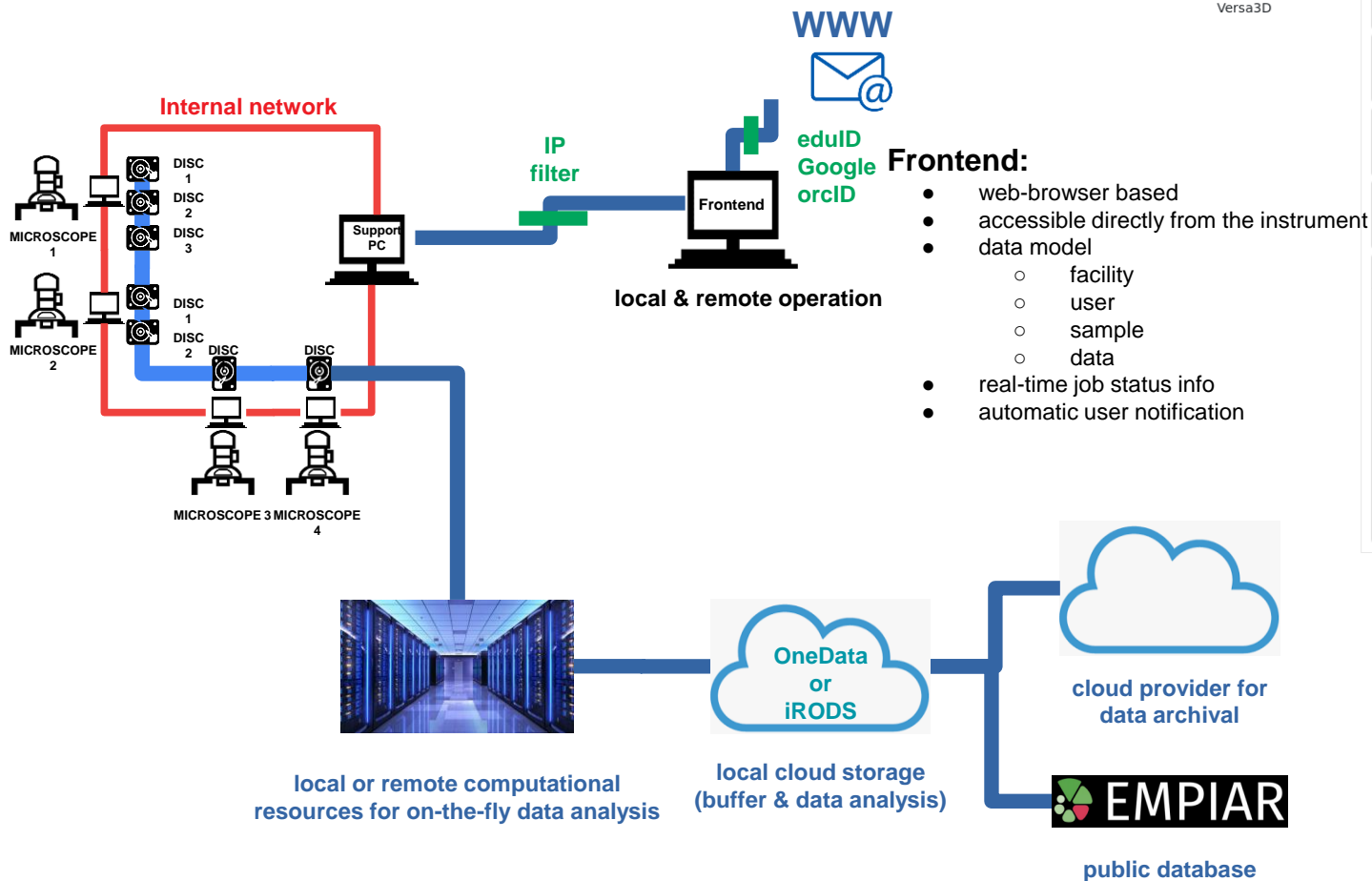
Updated data life cycle



CEMCOF data workflow



CEMCOF data workflow



TalosArctica

TitanKrios

TalosF200C

Versa3D

Transfer data

SPA

Tomo

Operator - contact information of the person setting up the experiment

User - contact information of the data owner [Same as operator](#)

Project

Sample

Job

Data path

Remove all data from the microscope after job termination

Pixel Size 0 A/px

Defocus max. 0 A

FrameDose 1 e/A²

Voltage 200 kV

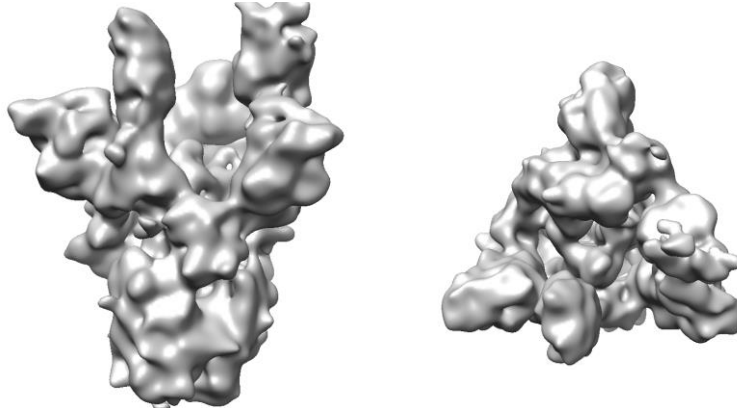
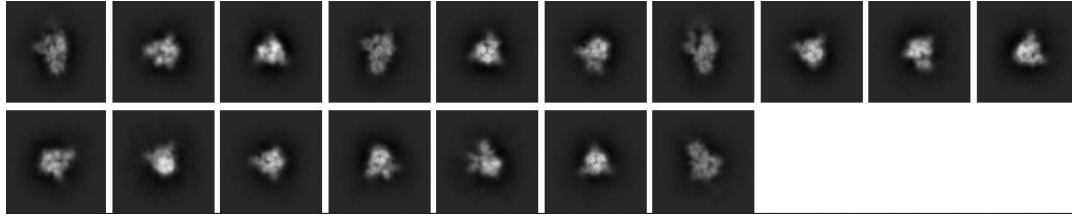
Defocus min. 0 A

Cs 2.7 mm

Phase Plate

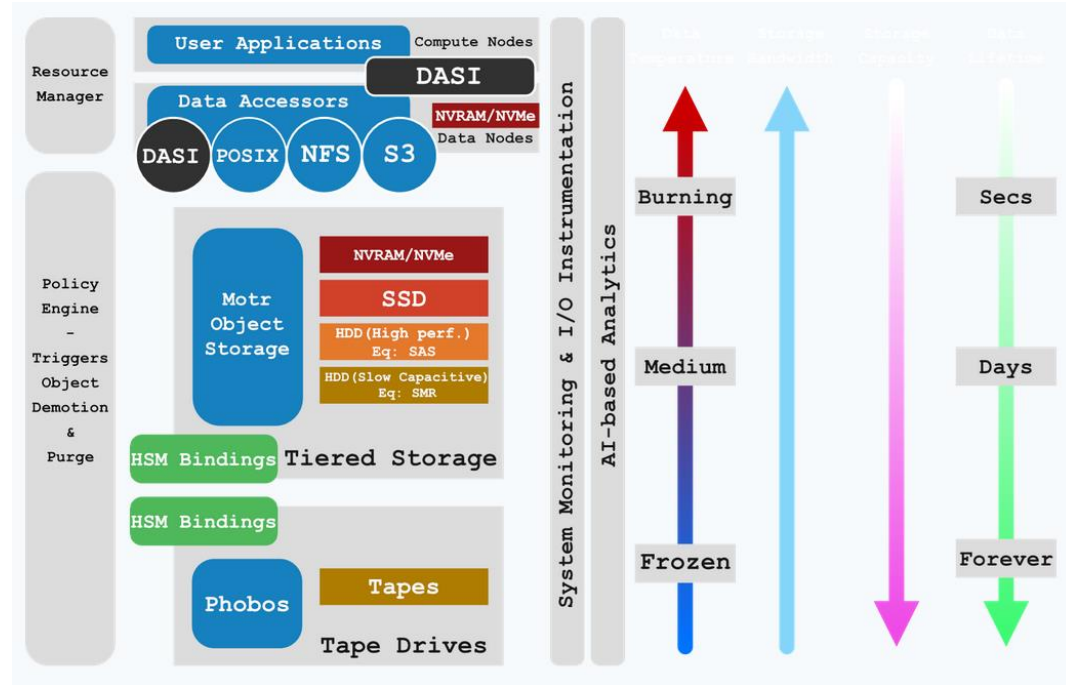
By-COVID

- structural analysis of the Sars-CoV-2 spike protein with different antibodies
- different spike proteins: Wuhan, Delta, Omicron
- already analysed 10+ commercially available antibodies



IO-SEA

- H2020-JTI-EuroHPC-2019-1
- started 1st April 2021
- 10 partners, 36 month, 8M EUR
- project partner and use case leader
 - remote on-the-fly data analysis
 - cloudification and management of large cryo-EM data



IO-SEA

- experience
 - project is task focused
 - direct involvement in the project
 - orthogonal expertise to the core partners (HPC)
 - sub-projects/use cases - important part of the project
 - efficient communication within consortium

