MAX PLANCK INSTITUTE
FOR THE SCIENCE OF LIGHT

DCOR: A DATA REPOSITORY INTEGRATING POSTPROCESSING, BASED ON CKAN+S3+SLURM AT MPCDF

HPC Cloud Workshop
Max Planck Computing & Data Facility, Garching

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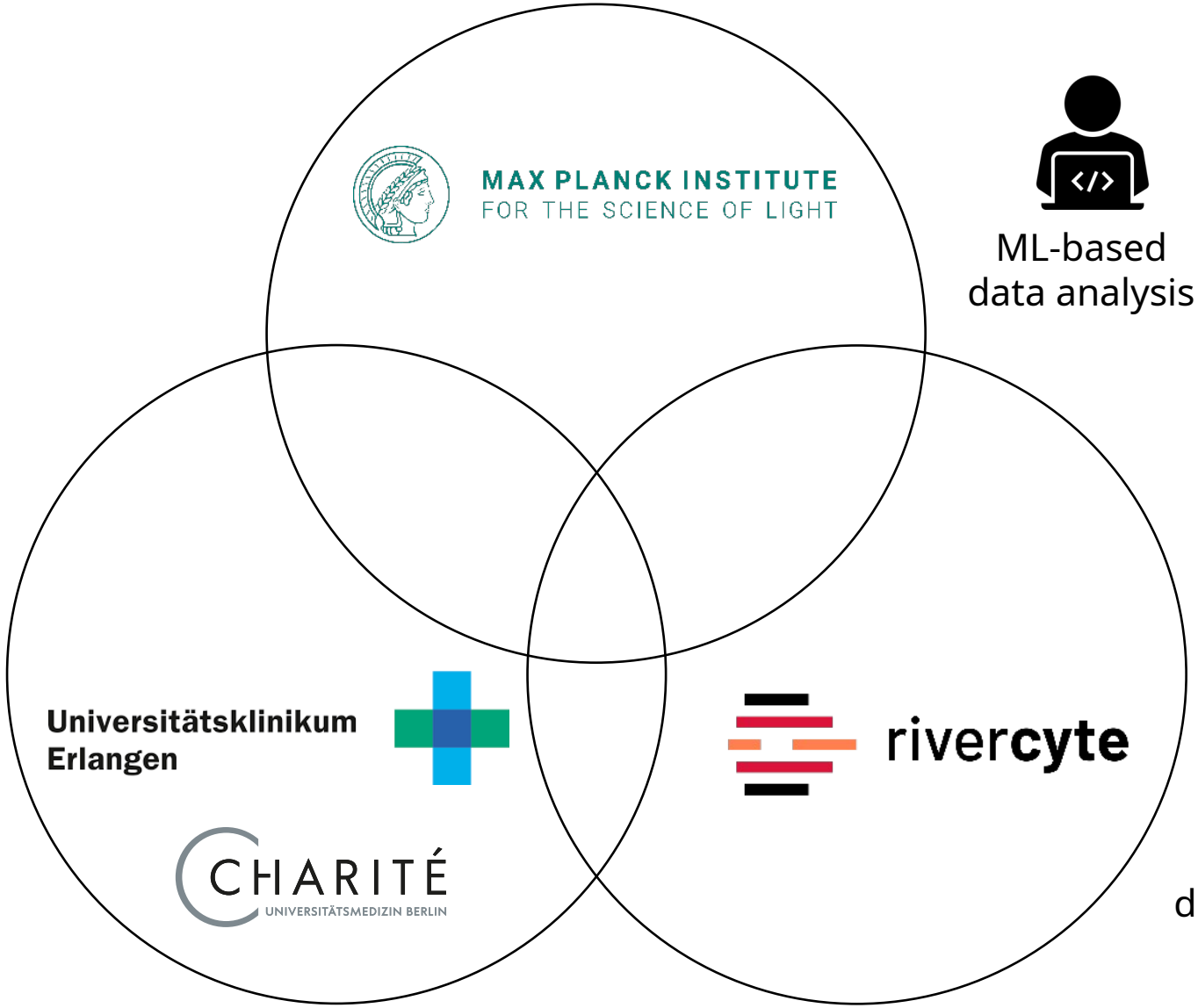
CONFLICTS OF INTEREST DECLARATION

Paul Müller is Co-Founder of Rivercyte GmbH, a company that markets a deformability cytometry device with the aim of establishing a new medical blood test.

THE BIG PICTURE



ML-based
data analysis

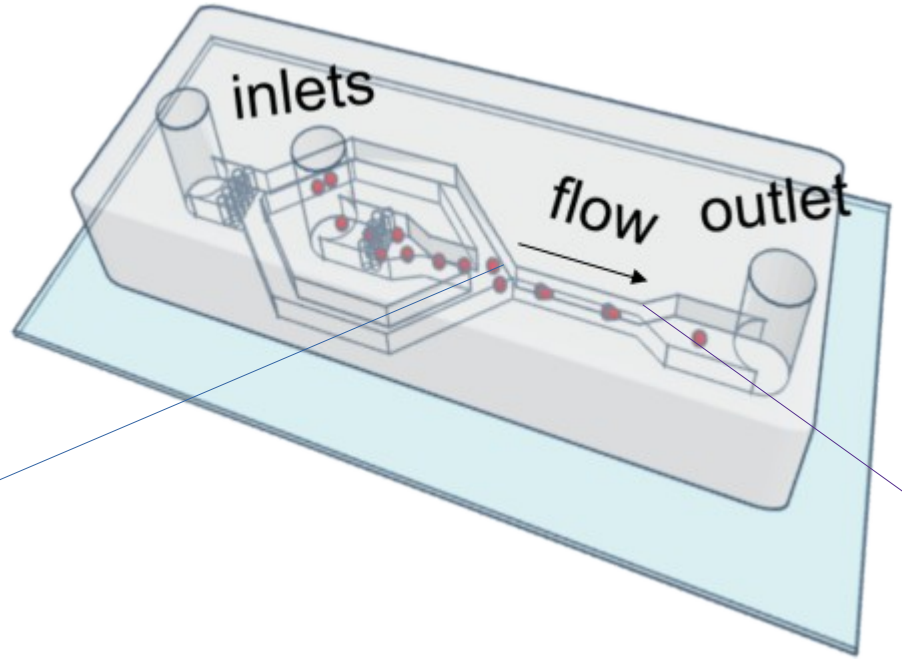
Measurement of
2000 patient
samples

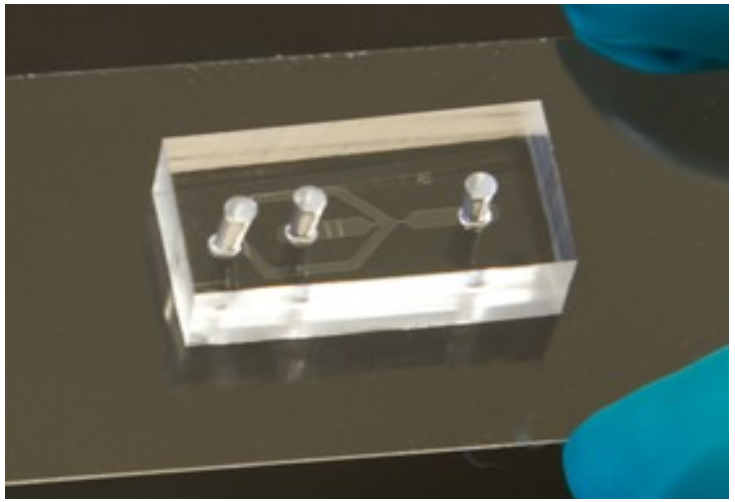
Hardware
development

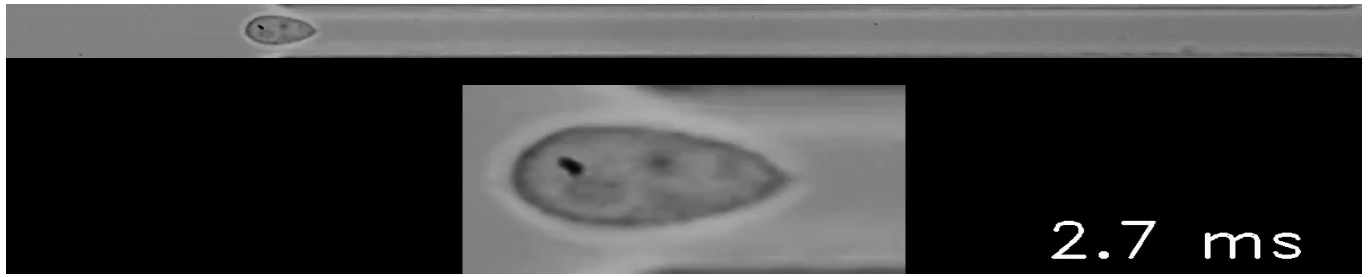
bayern innovativ

Bayerisches Staatsministerium für
Wirtschaft, Landesentwicklung und Energie

DATA ACQUISITION







- 10 min measurement
- 1 000 000 cell images from 1µL of blood
- label-free
- single-cell image-based analysis

Otto O, et al. Nature Methods (2015)
Rosendahl P, et al. Nature Methods (2018)

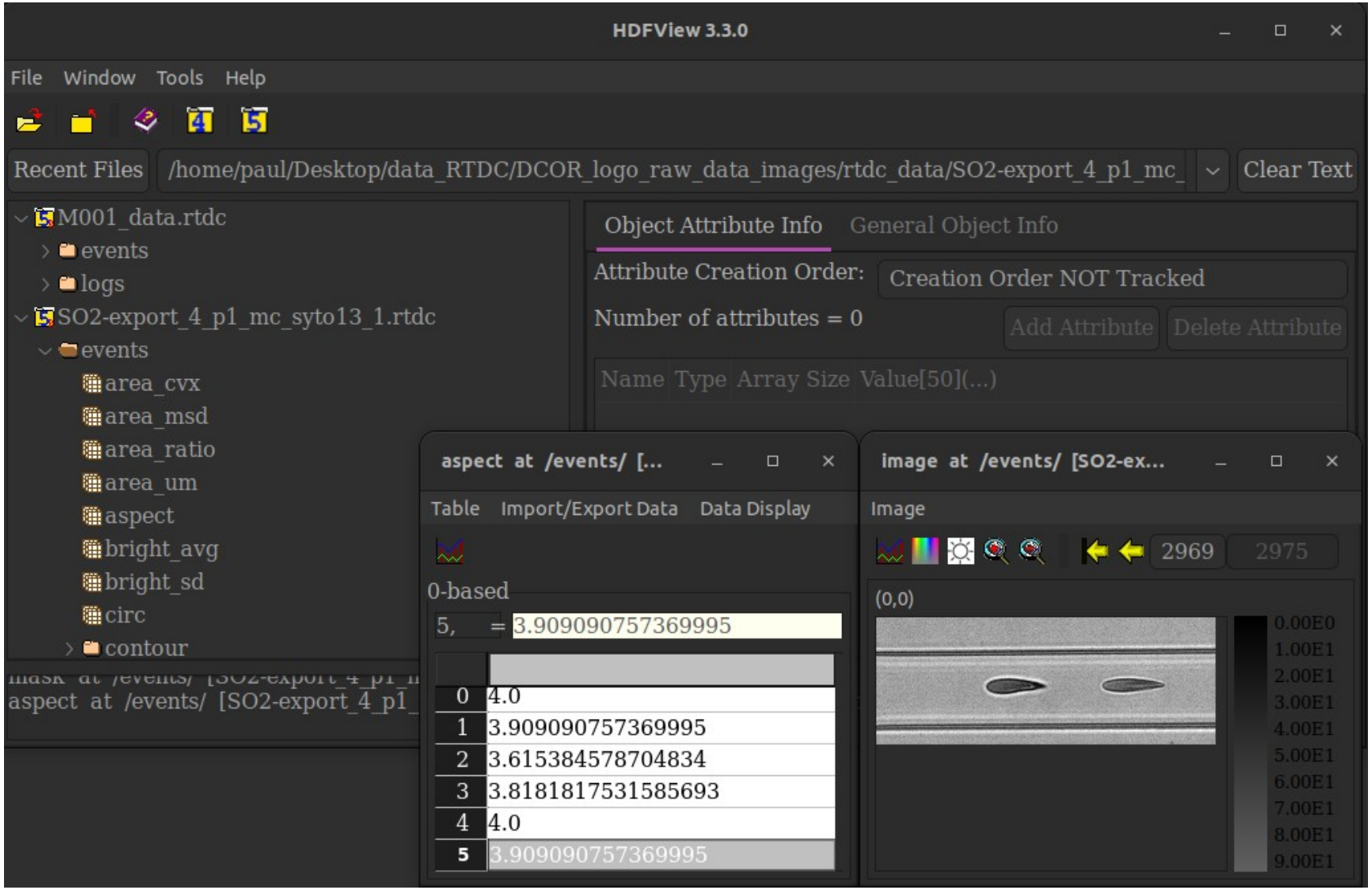
DEFORMABILITY CYTOMETRY DATASETS

HDF5 file format
~20GB per file

Data types
- Image data
- Scalar data
- Meta data
- Logs

Features
- Zstd compression
- Fletcher32 checksums
- Dataset slicing
- Custom chunk sizes

Integrates well with all major programming lanugages.



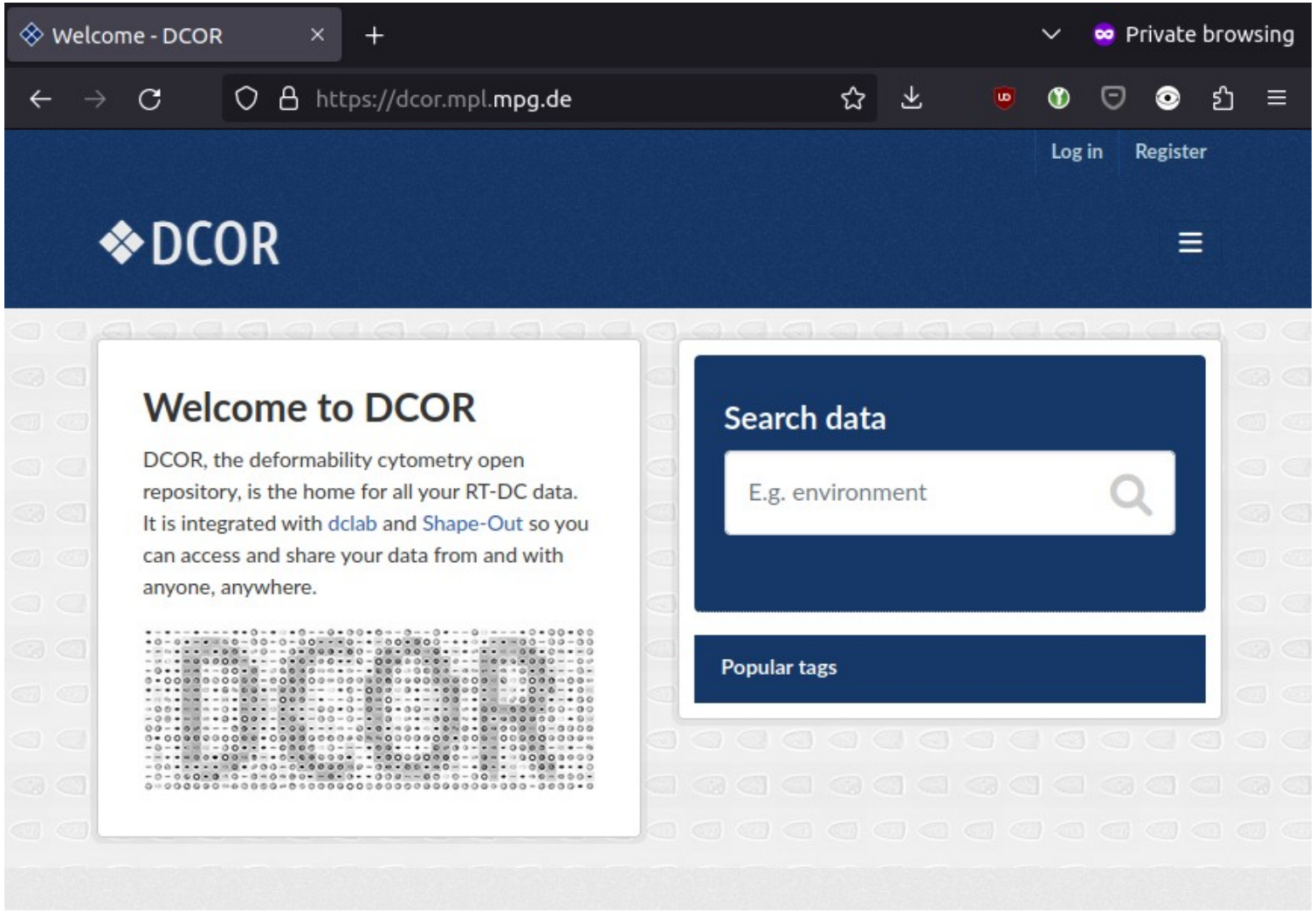
DATA STORAGE SOLUTION: DCOR

Motivation:

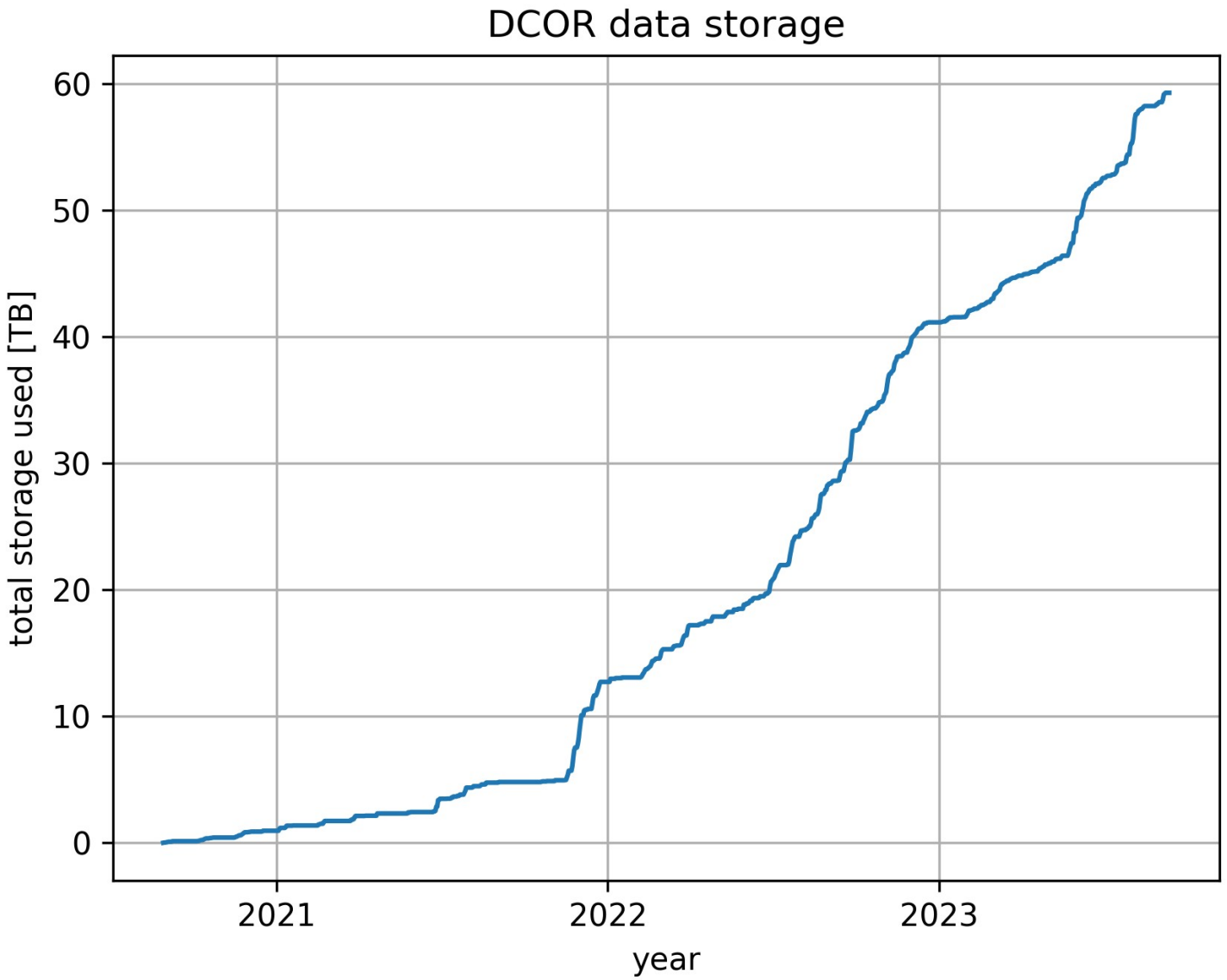
- data accessible from everywhere
- data upload from anywhere
- share with collaborators
- Immutable, citable datasets
- data access (slicing)

Implementation (MPCDF):

- Ubuntu 20.04
- CKAN with self-written plugins (authorization, visualization, data API, …) https://github.com/DCOR-dev
- S3 object storage (HPC-Cloud)
- S3 archived at MPCDF



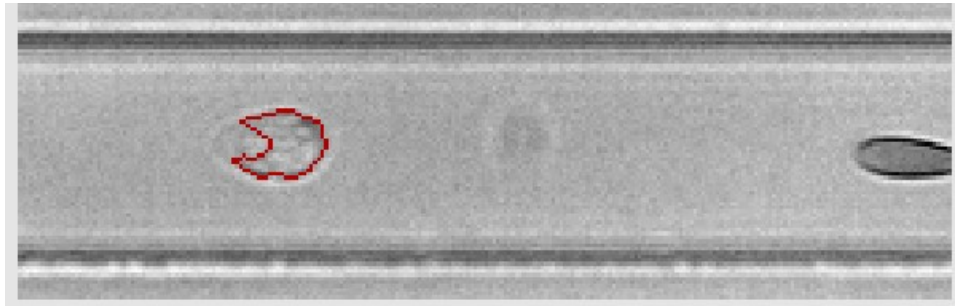
DATA STORAGE

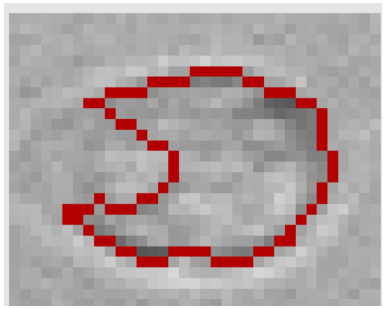


- Data stored on S3 (HPC-Cloud / OpenStack)
- pre-signed URLs for upload, download, or **partial access**
- DCOR-Aid GUI software for data management

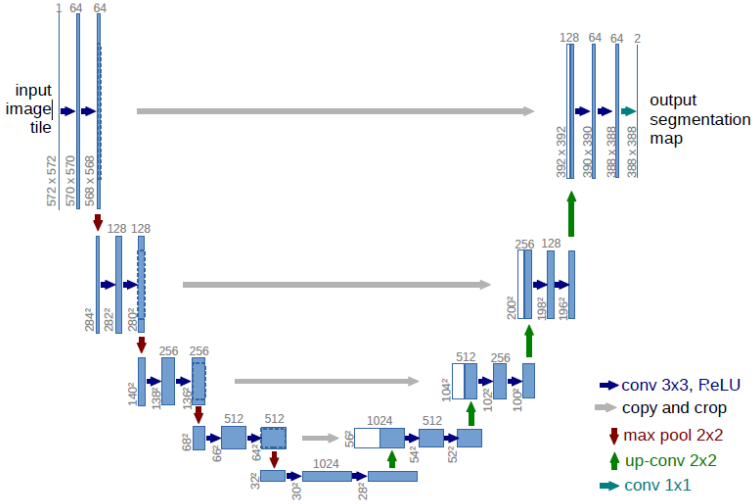
DATA POST-PROCESSING

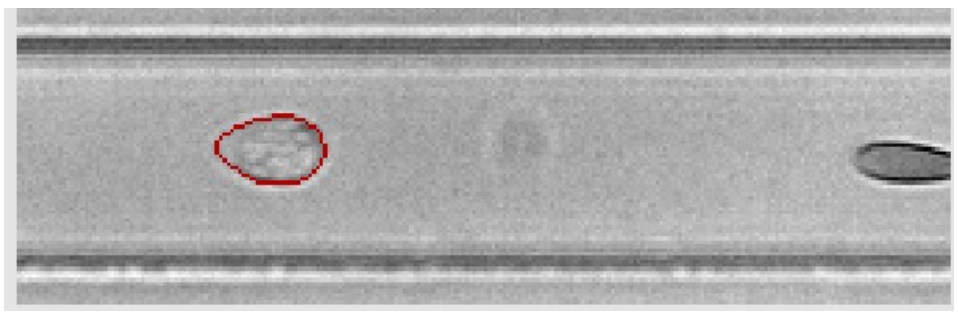
Threshold-based segmentation

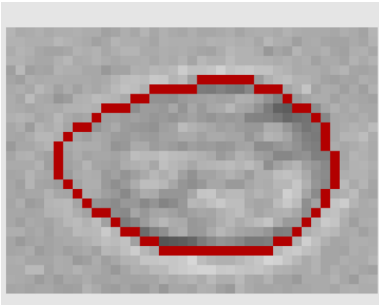


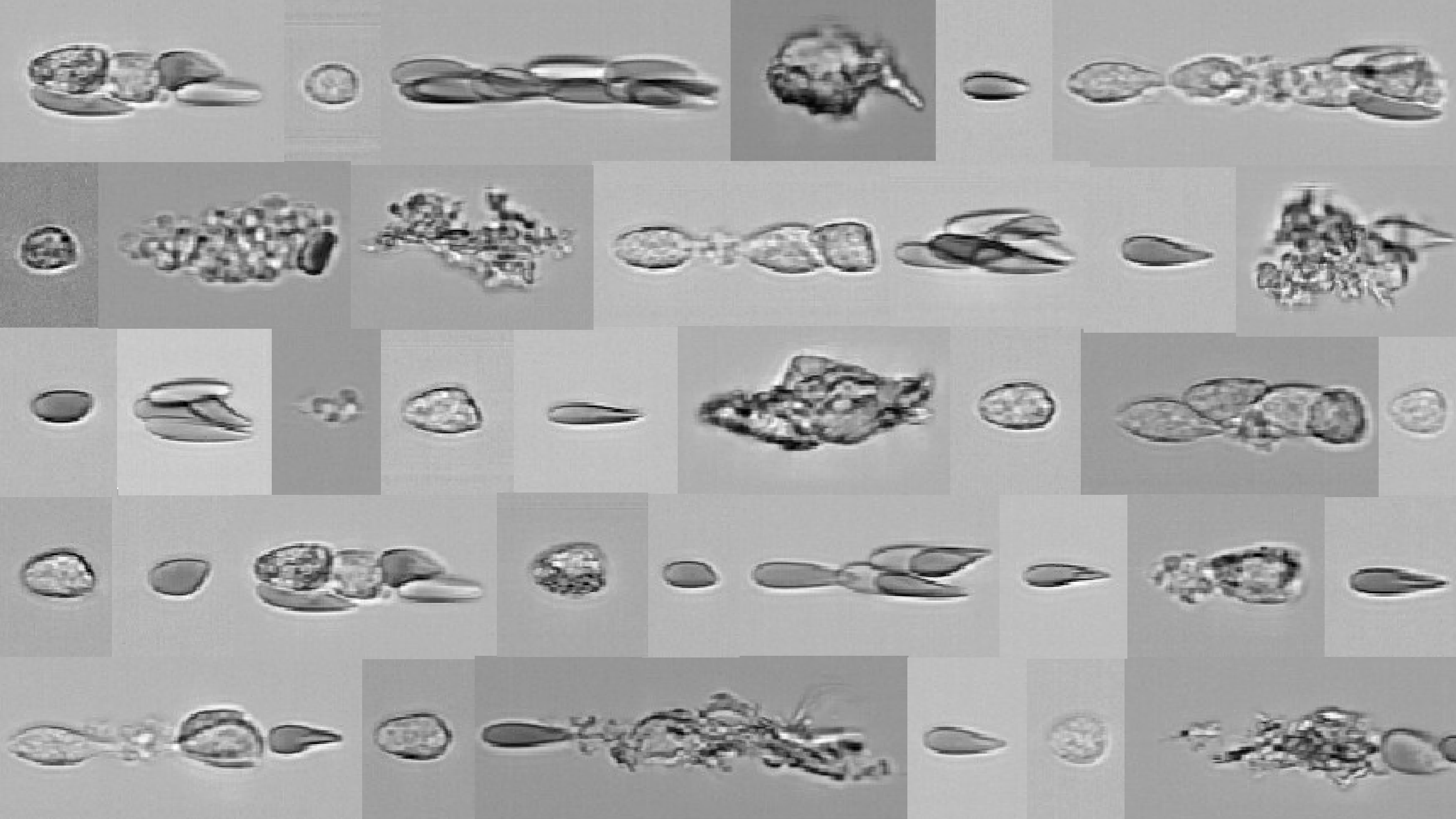


Machine-learning (UNET) segmentation

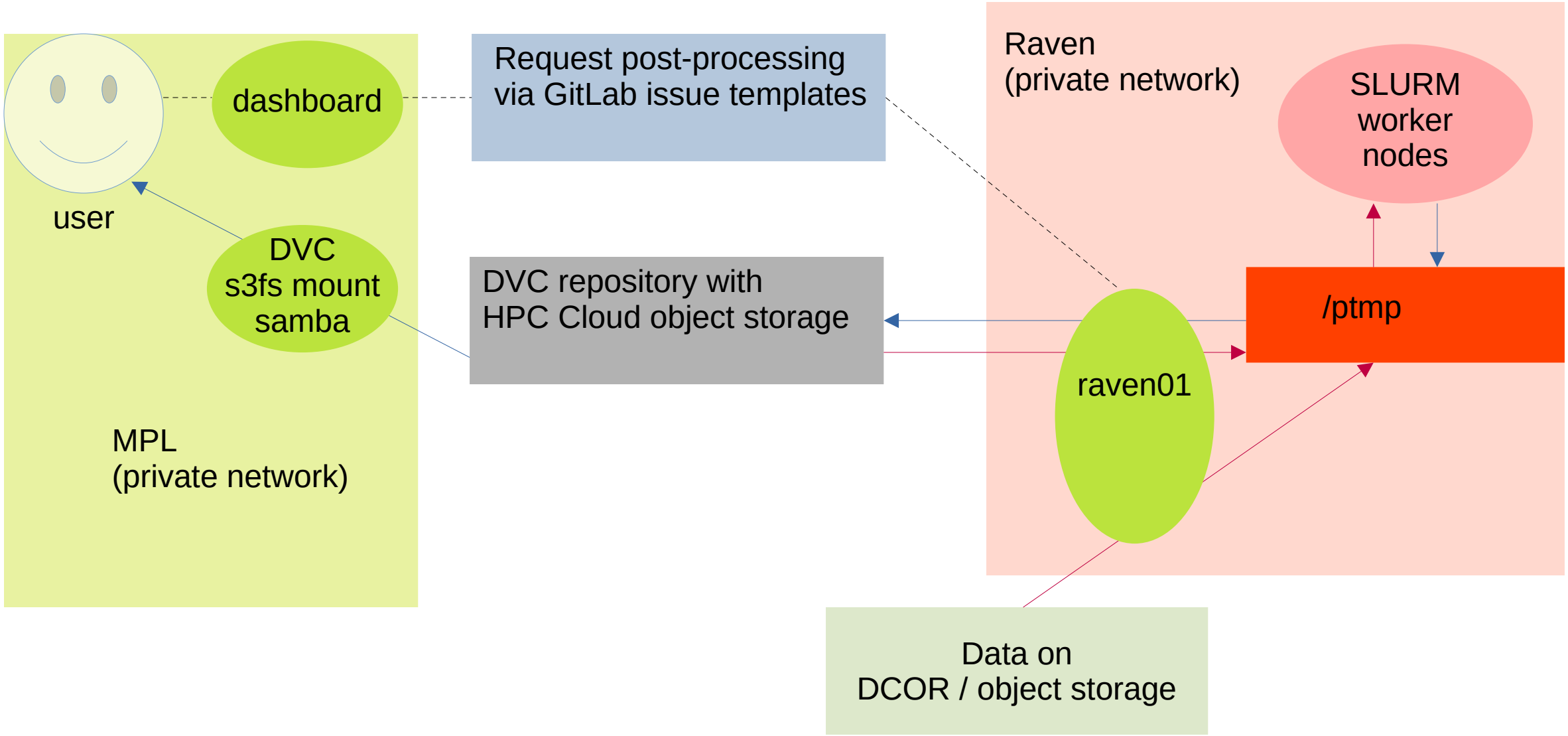




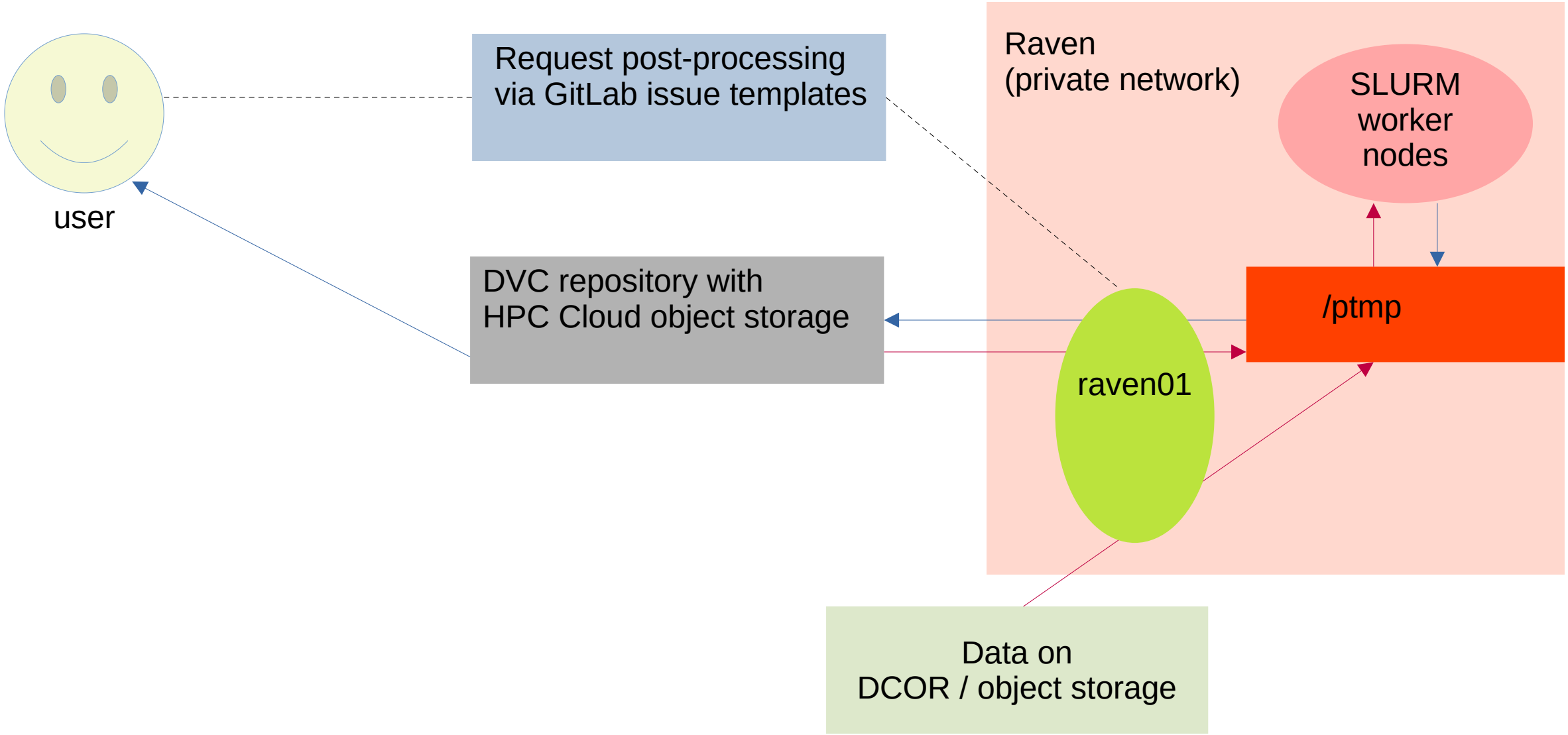




AUTOMATED DATA POST-PROCESSING AT MPCDF



AUTOMATED DATA POST-PROCESSING AT MPCDF



Thank You!

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