Remote Laboratory for Digital Holographic Metrology

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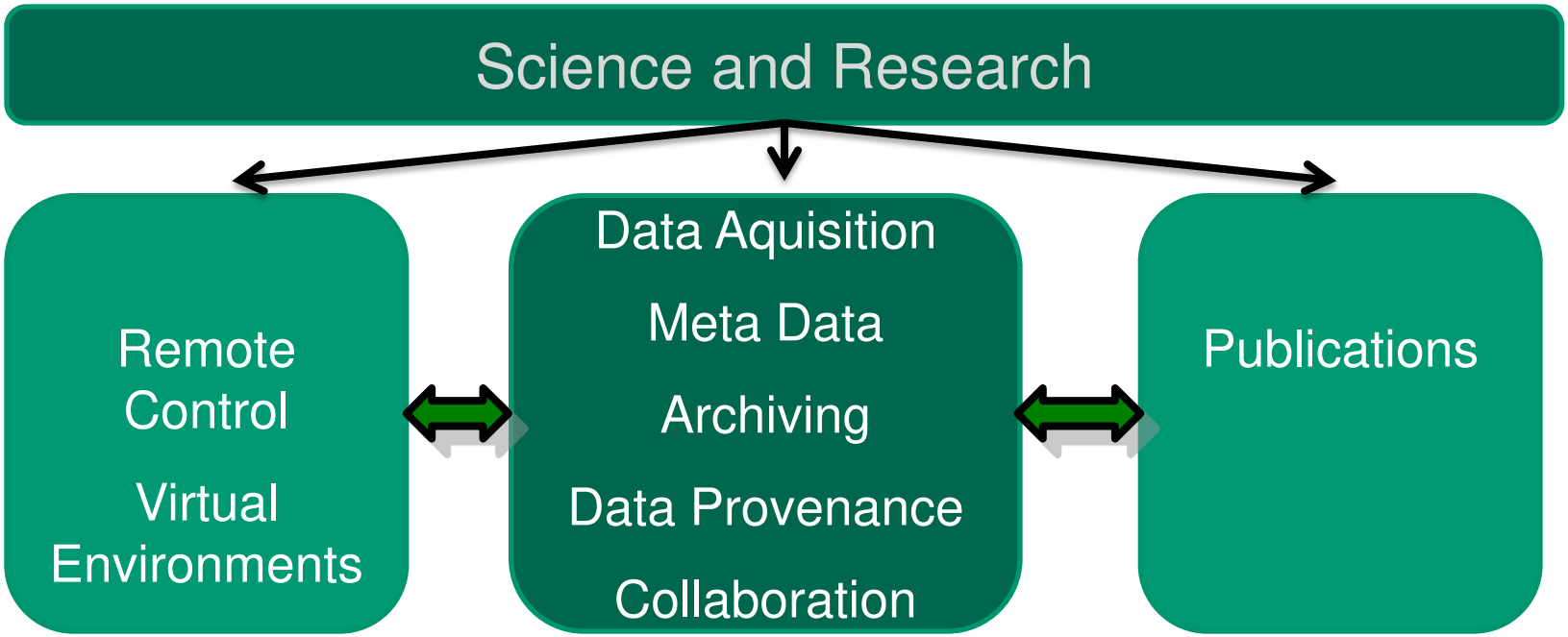
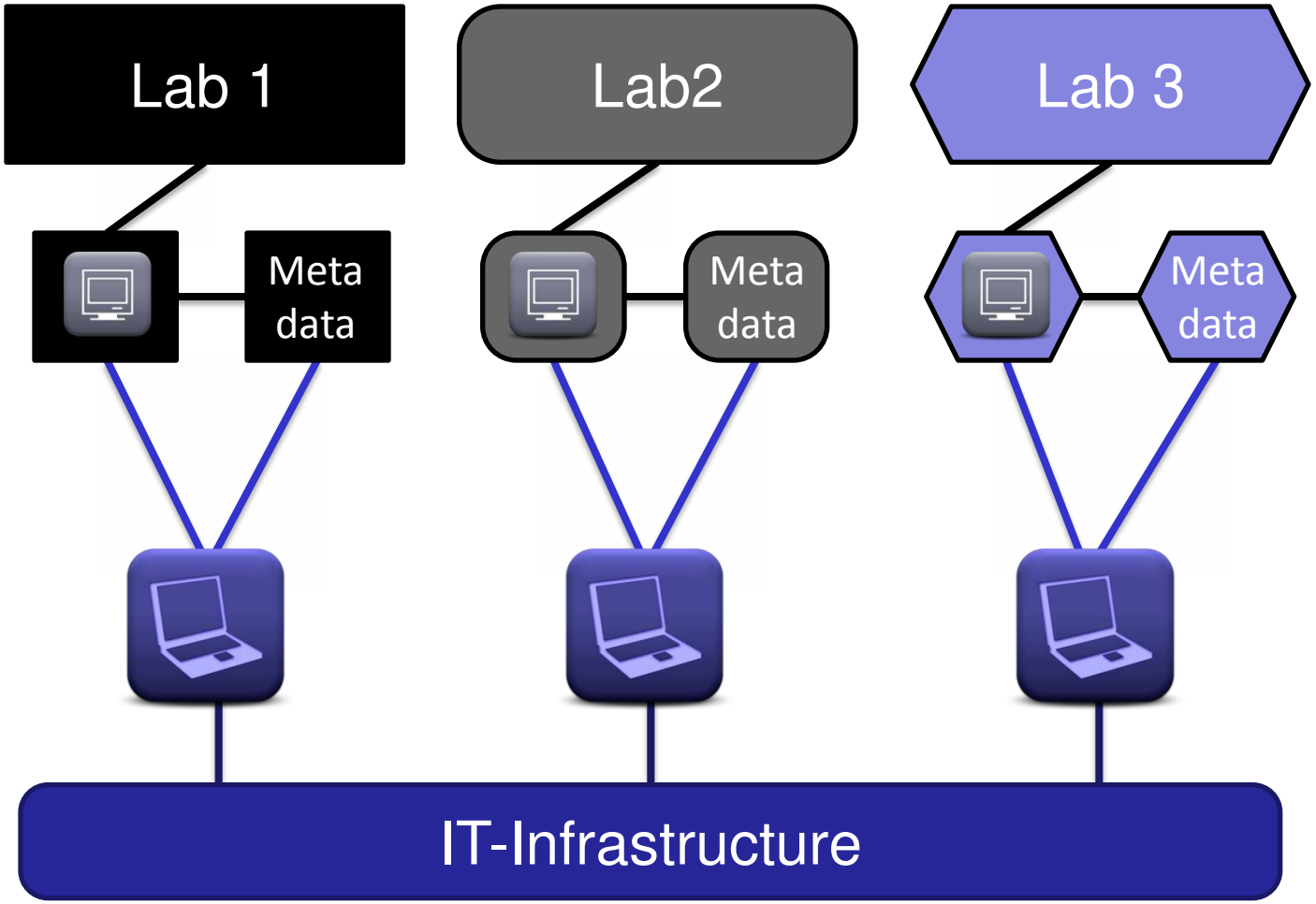
Motivation

- Scientists wish to collaborate on research
- Raw data is already often recorded and analyzed using computers
- Conditions of the measurement process need to be recorded to interpret the raw data (traditionally in a lab book)
- Publication of raw data desirable

Motivation


Science and Research
Remote Control
Virtual Environments
Data Aquisition
Meta Data
Archiving
Data Provenance
Collaboration
Publications

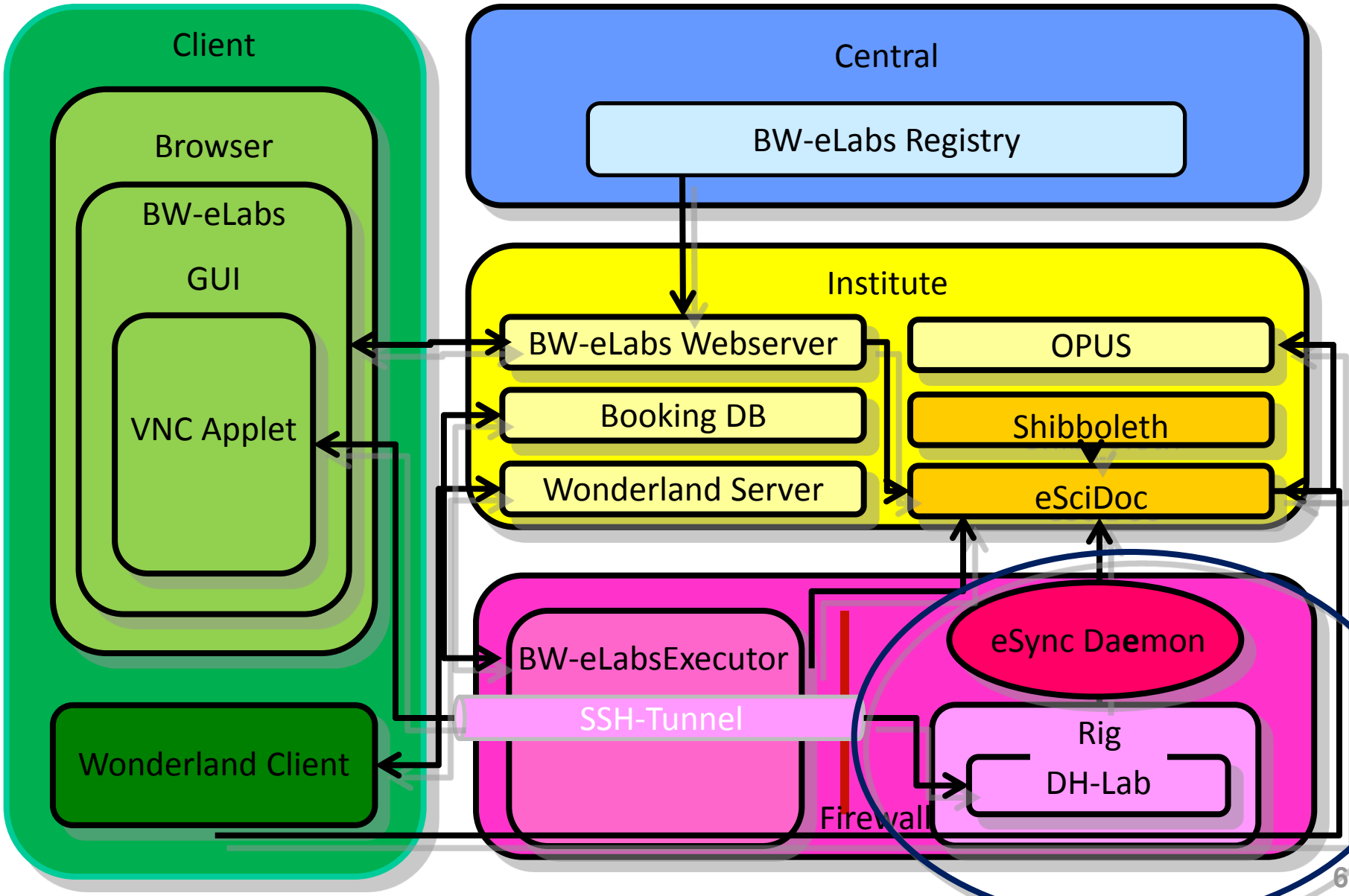
Motivation


Lab 1
Lab2
Lab 3
Meta data
Meta data
Meta data
IT-Infrastructure

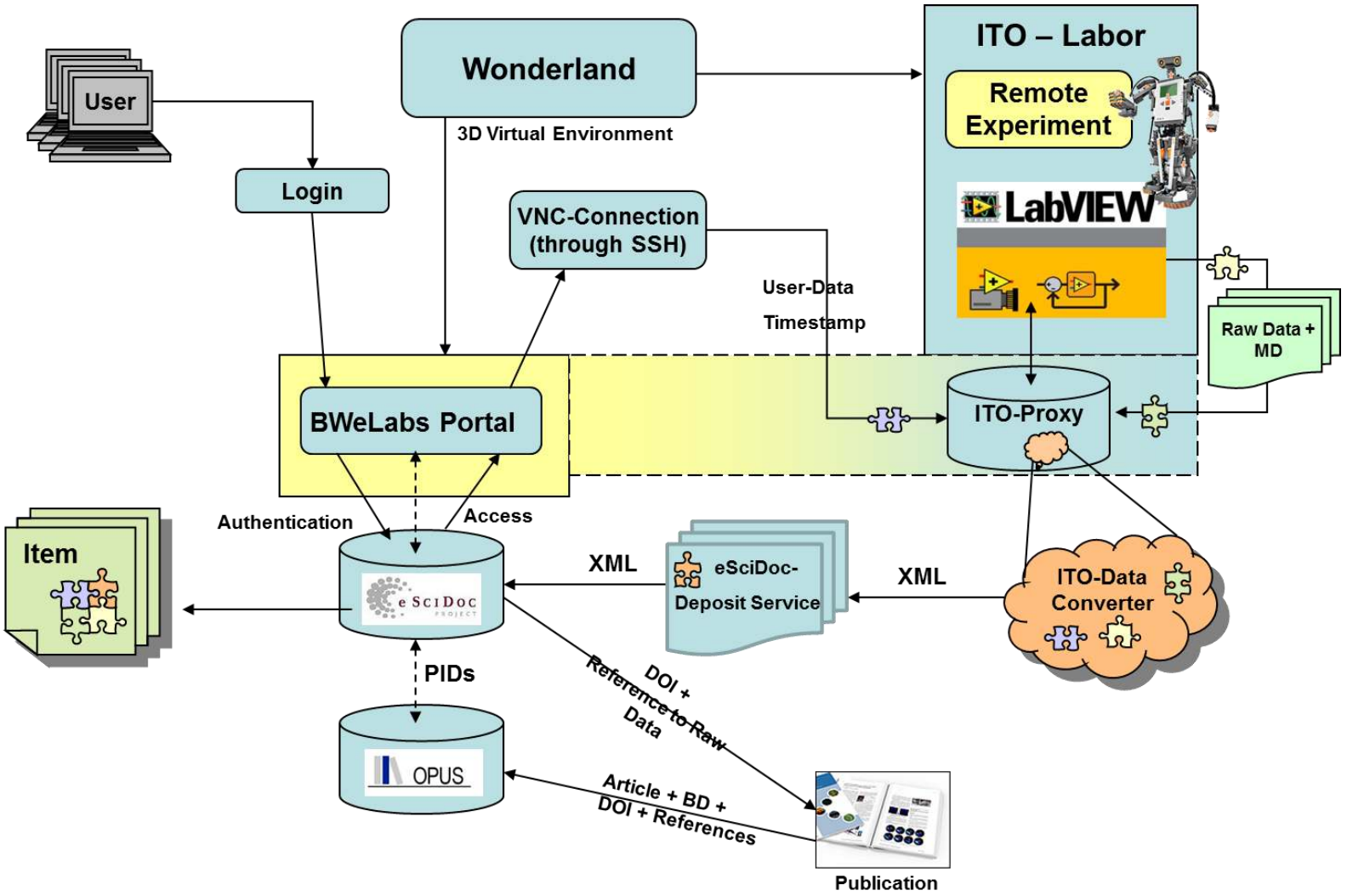
Aim of BW-eLabs

- Design an Infrastructure for automatic recording, storage and access to research data
- Secure, single sign-on access to labs without loss of local control
- Support of publication process, including publication of raw data
- Support for integration of specific labs

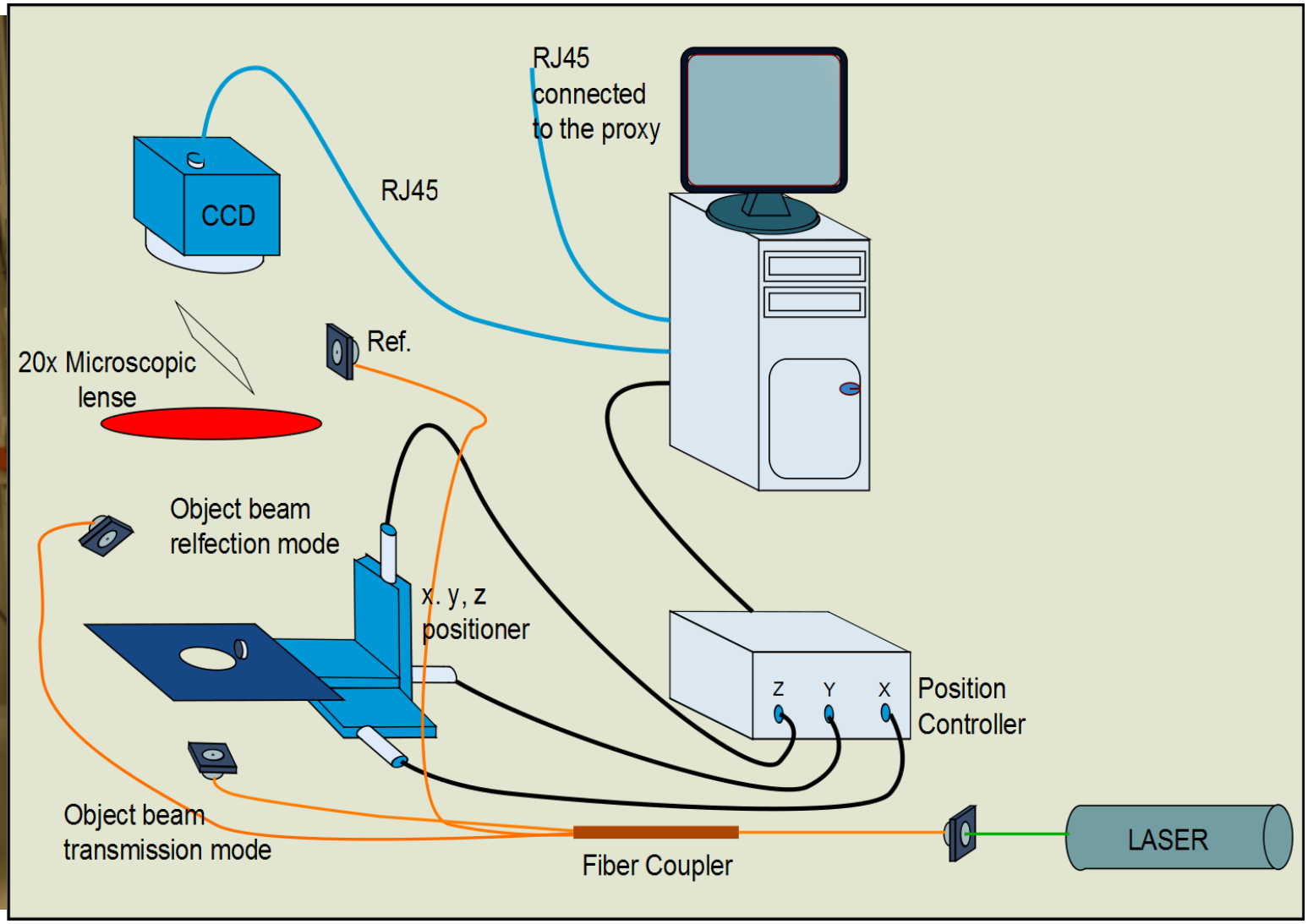
BW-eLabs Architecture



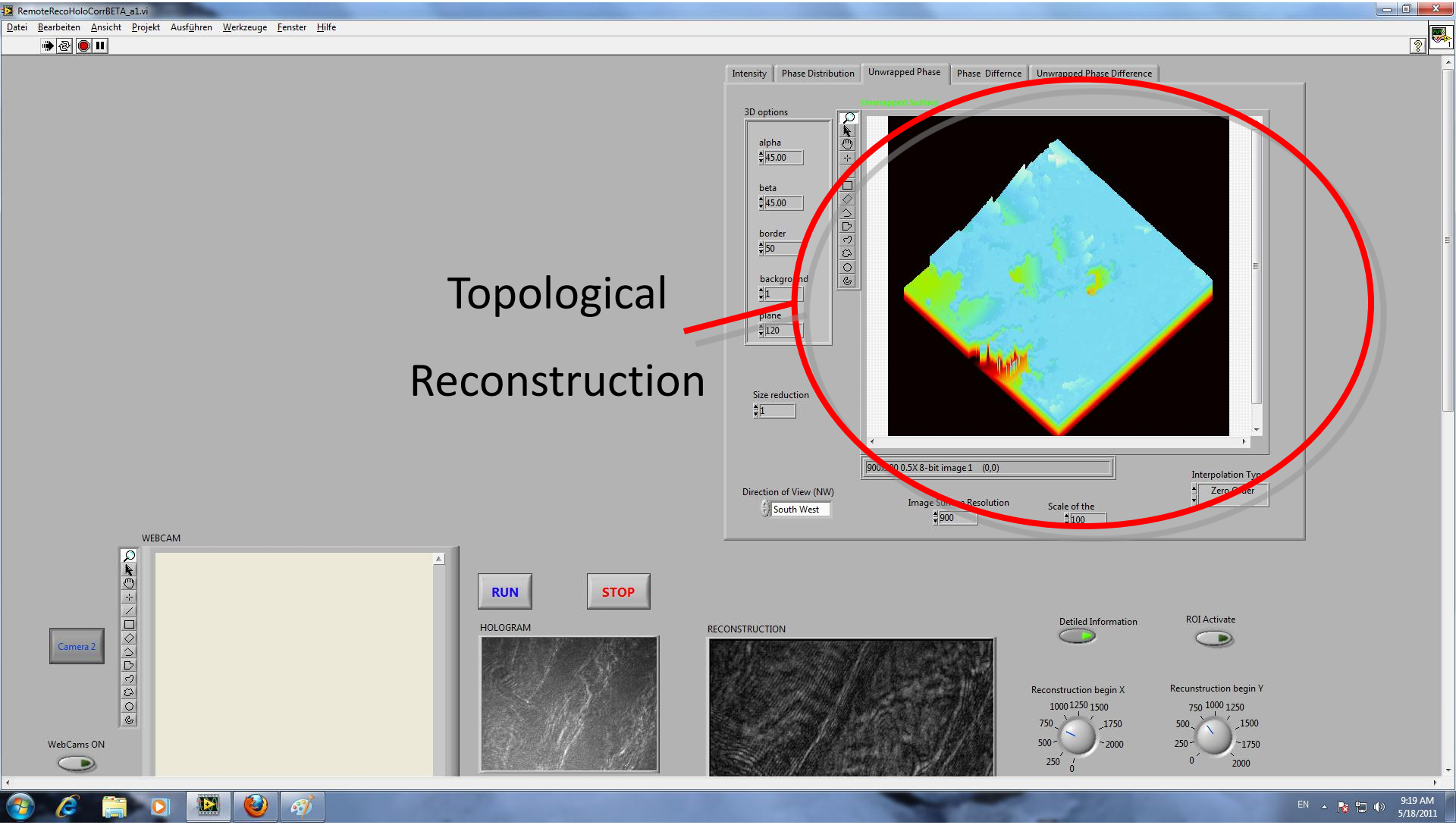
Dataflow in BW-eLabs



DH Lab - Setup


RJ45
connected
to the proxy
CCD
RJ45
20x Microscopic
lense
Ref.
Object beam
relfection mode
x. y, z
positioner
Z
Y
X
Position
Controller
Object beam
transmission mode
Fiber Coupler
LASER

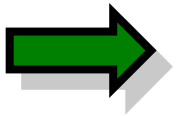
DH Lab - GUI



Topological

Reconstruction

DH Lab

- Hologram stores all optical information of an object  Well suited for remote collaboration
- Complete state of the system can be saved and restored automatically (including geometry and position, reconstruction, description of experiment, description of Holograms)
- Searchable Meta Data generated and stored automatically in eSciDoc database

Results and Future Work

- BW-eLabs implements an infrastructure for handling research data
- DH Lab implemented as a demonstrator
- Low level integration of additional labs already feasible through generic interfaces (VNC, eSync Daemon, eSciDoc Deposit Service)
- Future Work: 3D Interface in Wonderland, publication of raw data

Acknowledgement

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  - Freiburger Materialforschungszentrum (FMF) und RZ der Universität Freiburg
  - Hochschule der Medien

Thank You for Your Attention