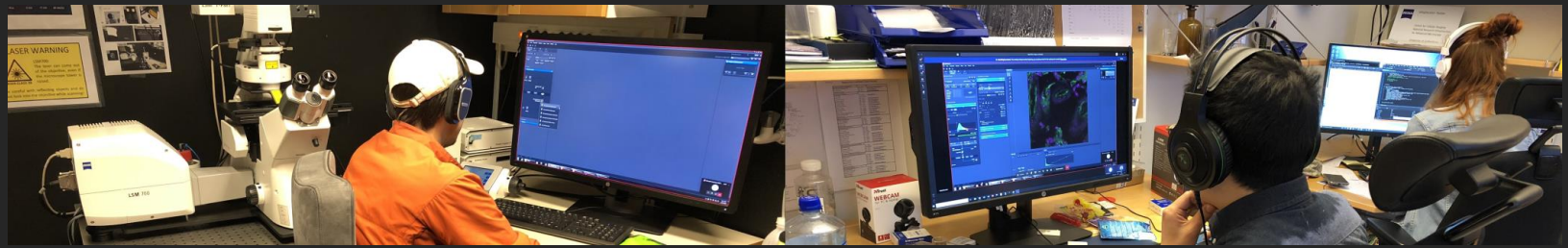
UNIVERSITY OF GOTHENBURG

Remote Access in a Microscopy Core Facility

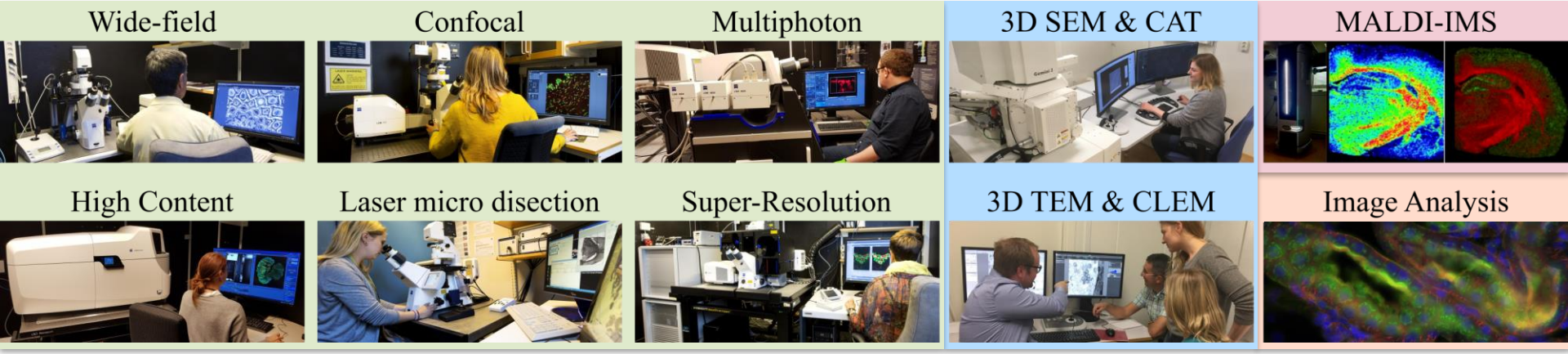


RAFAEL CAMACHO | SCIENTIFIC OFFICER | CENTRE FOR CELLULAR IMAGING

The Centre for Cellular Imaging

- The Centre for Cellular Imaging (CCI) is a national core facility that integrates both light and electron microscopy – National Microscopy Infrastructure
- The CCI offers open-access state-of-the-art imaging equipment
- Researchers from universities or companies in Sweden and from abroad are equally welcome!
- We are part of the Euro-Bioimaging Swedish node

The Centre for Cellular Imaging



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https://www.gu.se/en/core-facilities/centre-for-cellular-imaging

Open-access: A User-Centric Facility

Users are trained in the operation of the microscopes so they become independent, and can have access to the microscopes 24/7 (depending on training level).

We offer continuous support via project consultation, training, data processing, etc.

- Current training method for all users
  - ➢ Remote session: focus on the software (2-3 h)

    Recommendations: Ethernet internet connection, a large screen, and a headset.
    Training session is recorded and user has access to the video afterwards.

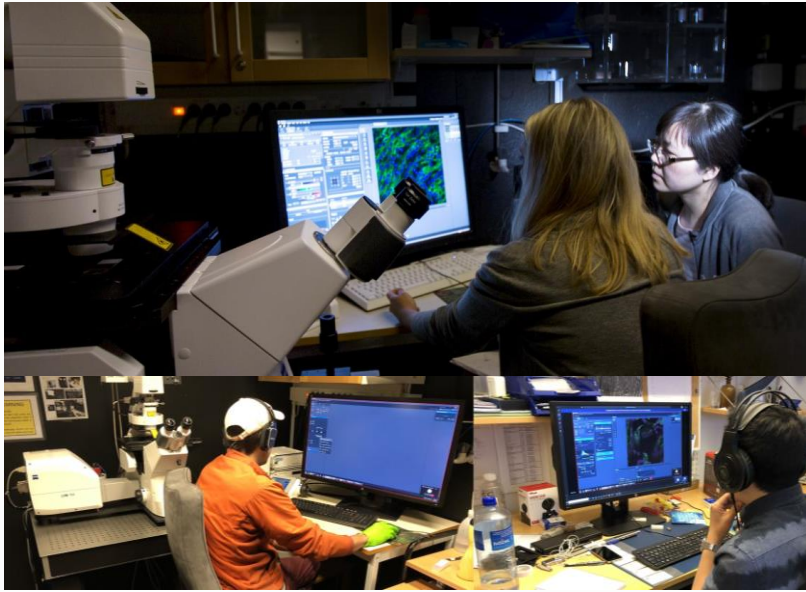
  - ➢ On-site session: focus on hardware / user sample (2-3 h)

- We use Microsoft Teams for remote interaction

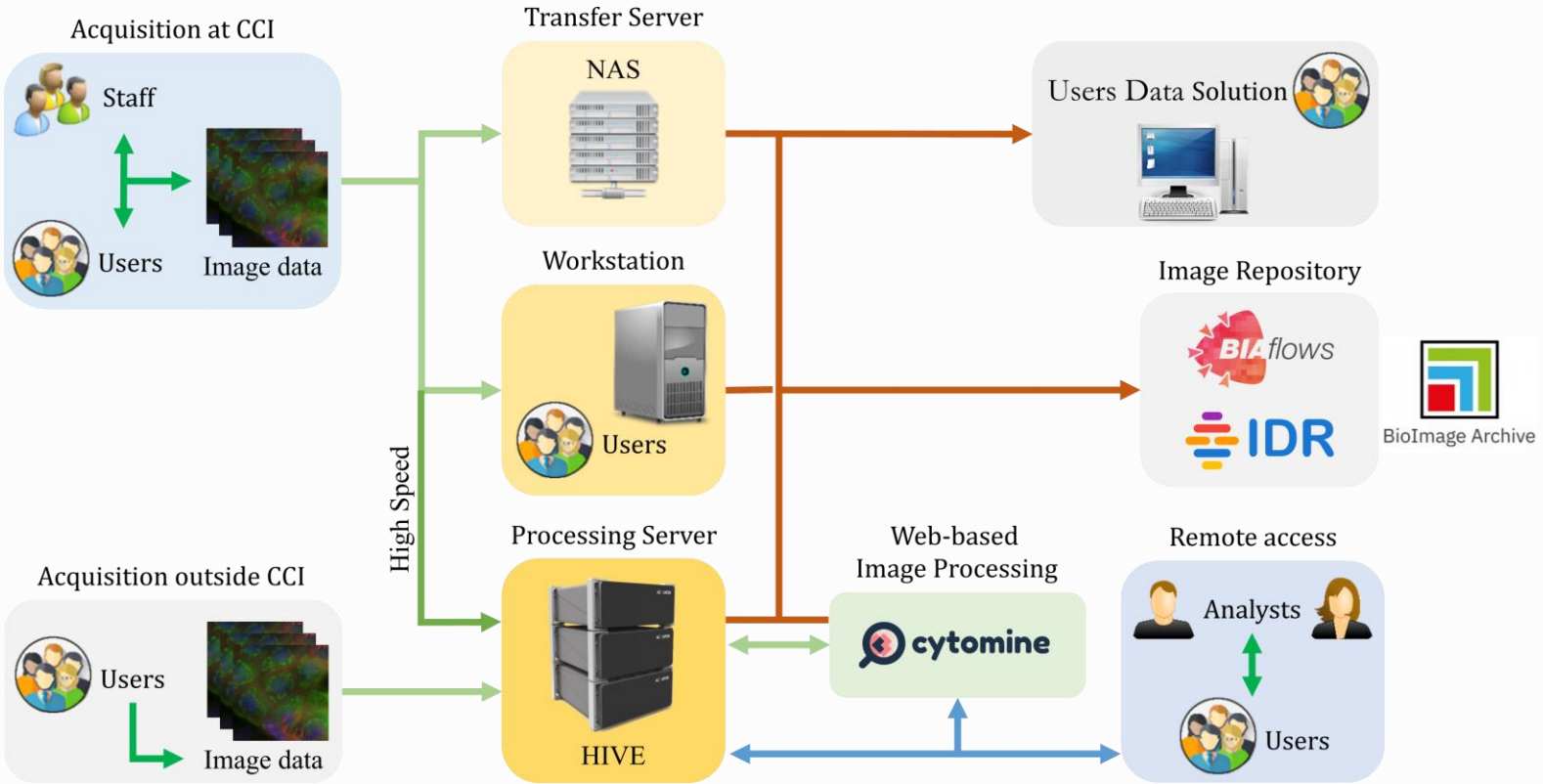
- Microscopes are in an intranet: no free access to the internet, and we use a proxy to allow Microsoft Teams.

Remote services

- Remote support to on-site users
  - operator: user, remote: staff
- Acquisition guided by remote user feedback
  - operator: staff, remote: user
- Remote instrument control
  - operator: remote user – demo during workshop
- Data management
- Image analysis support
  - remote access to analysis server



Data Management Plan



Remote instrument control

Setting up unsupervised remote instrument control services is challenging and a clear road map does not exist. General considerations:

- Safety of the equipment
- IT infrastructure of the host institution
  - Communication speed
  - Data management: efficiently transfer the data to store solution
- Training procedure
- Is remote control needed? In many cases remote monitoring of experiments might be enough
- Democratization of resources
- Smart microscopy: automation and feedback microscopy

Democratization of resources

Remote microscopy services require the interaction between microscopists, software developers, bioimage analysts, and end users. This must be facilitated by a user-friendly IT infrastructure that allows collaborative workflows.

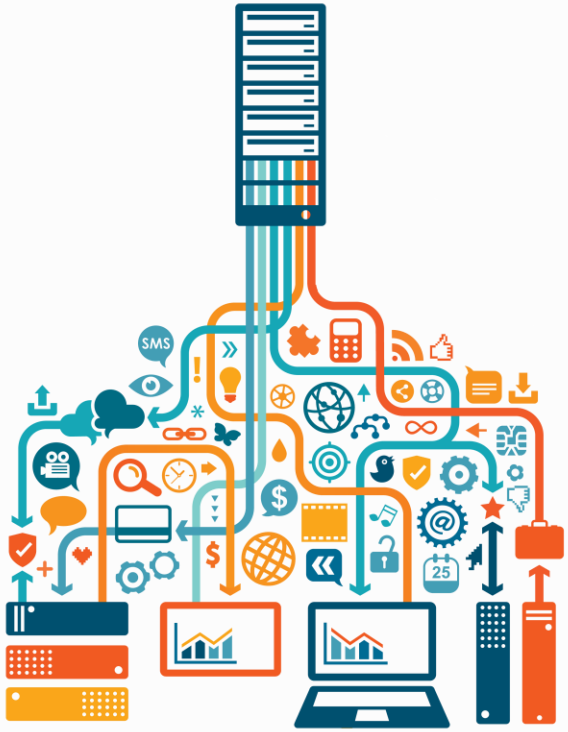
To further allow access from external users we are optimising shipping procedures of biological samples to the CCI for their imaging over long periods of time, outside of office hours, thanks to smart microscopy workflows as well as remote access to automated microscopy equipment.

We argue that the preparation of biological samples at the source and shipping them to the CCI is often more efficient than re-implementing the biological model at the facility. Most importantly, a collaboration by courier improves the reproducibility of data and allows the completion of long-term, open-ended research projects.

OME apeer IDR

cytomine .ORG

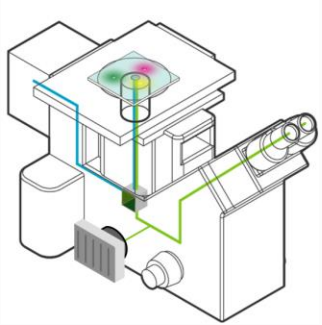
BioImage.IO



Smart Microscopy | Feedback Microscopy

Over the last decade, much effort has been made to connect bioimage analysis (used to, e.g., detect specific cells in microscopy images) with fully motorised and computer-controlled microscopes (via proprietary or open-source software packages) to generate automated and adaptive imaging workflows, referred to as ***smart microscopy***.

Nature Biotechnology, 33, 815–818 (2015)



Pycro Manager

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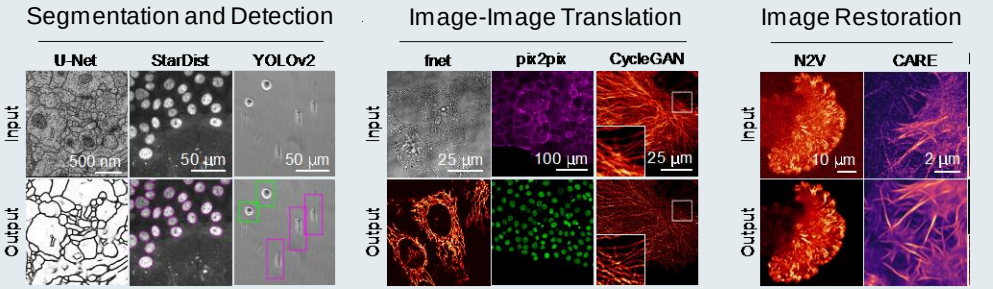


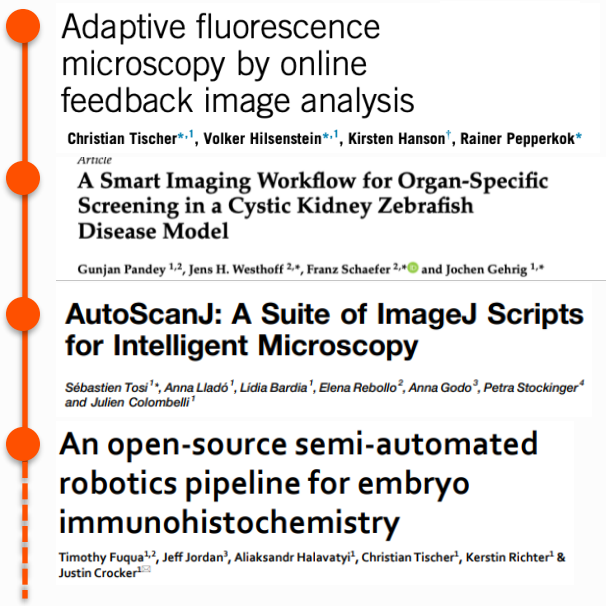
von Chamier L et al Nat Communs 2021

Smart Microscopy as a service

Many smart microscopy workflows have been established as ad hoc solutions, difficult to share among laboratories and to become available to a broad number of users.

We believe that advanced Microscopy Core Facilities, such as the CCI, can take methods and concepts of smart microscopy and make them available to the research community.

At the CCI, we are proud to be recognized by SSF, who is supporting the development of Smart Microscopy as a service via the Research Infrastructure Fellows 2 grant



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We are recruiting!