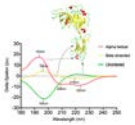
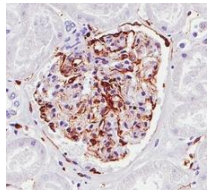
The Faculty of Medicine and LUNARC

Kajsa M Paulsson, Lund University



A selection of infrastructures and core facilities at the Faculty of Medicine

Bio-Imaging

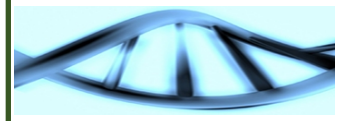


National 7T facility

LBIC
OPT and ACE at CRC
Multi-photon at BMC
CLEM at IQ Biotechnology
Image core at Immunology
TMA center
MicLU
CIPA

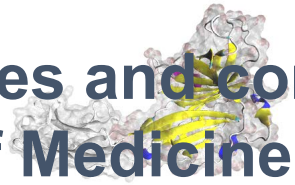
Genes & Cells

Clinical Genomics Lund (CTG/CMD) incl. Single-cell unit



LUBI-LSGA
NBIS node at FoM
Cellomics
FACS
AAV

Proteins (incl. PTM)



BIOMS

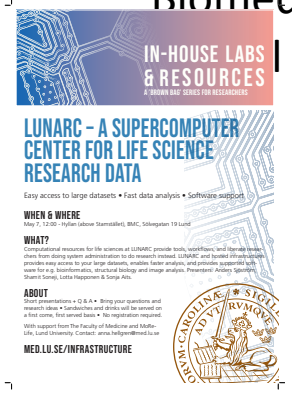
Center for Translational Proteomics
Biacore at IQ Biotechnology
MESO QuickPlex

LP3, nCRHEM, Lund Nanolab, NMR

Other resources

Biobank Sverige Nod Syd

Registers, e.g. EpiHealth
Biobanks
Health Science Lab and MoReLab
CBT Small molecule screening
LUPOP
LUZI - Zebra fish core
Biomedical services incl.
l facilities



ALF

LUND UNIVERSITY | FACULTY OF MEDICINE

REGION SKÅNE

IN-HOUSE LABS & RESOURCES

A 'BROWN BAG' SERIES FOR RESEARCHERS

LUNARC – A SUPERCOMPUTER CENTER FOR LIFE SCIENCE RESEARCH DATA

Easy access to large datasets • Fast data analysis • Software support

WHEN & WHERE

May 7, 12:00 - Hyllan (above Stamstället), BMC, Sölvegatan 19 Lund

WHAT?

Computational resources for life sciences at LUNARC provide tools, workflows, and liberate researchers from doing system administration to do research instead. LUNARC and hosted infrastructures provides easy access to your large datasets, enables faster analysis, and provides supported software for e.g. bioinformatics, structural biology and image analysis. Presenters: Anders Sjöström, Shamit Soneji, Lotta Happonen & Sonja Aits.

ABOUT

Short presentations + Q & A • Bring your questions and research ideas • Sandwiches and drinks will be served on a first come, first served basis • No registration required.

With support from The Faculty of Medicine and MoRe-Life, Lund University. Contact: anna.hellgren@med.lu.se

MED.LU.SE/INFRASTRUCTURE

In the borderland between Region Skåne and Lund University – collecting human data

The planned MoRe Lab at Forum Medicum

LUNARC
L-SENS

ICU measurements

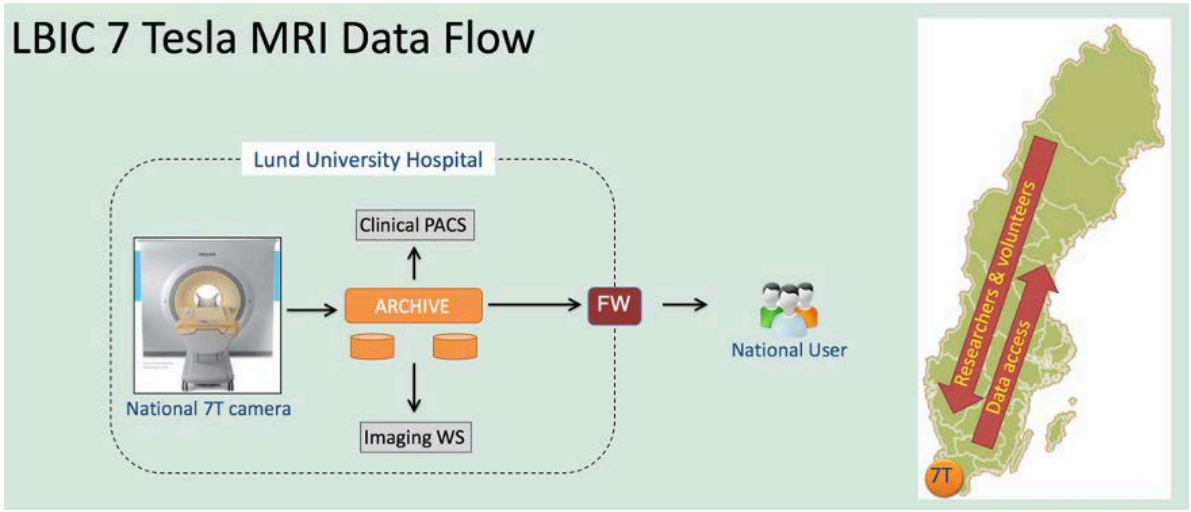
Need for secure channels and computational resources for sensitive data (L-SENS)

- LUNARC L-SENS resources from 2017-2018, used by e.g., LUCC (Lund University Cancer Centre)
- Stand-alone resources through LUBI-LSGA (bioinformatics)
- RS-SENS

The 7Tesla@LBIC and LUNARC

National 7T facility

The 7Tesla facility provides a national infrastructure for magnetic resonance imaging



Need for secure storage and handling with access from different universities

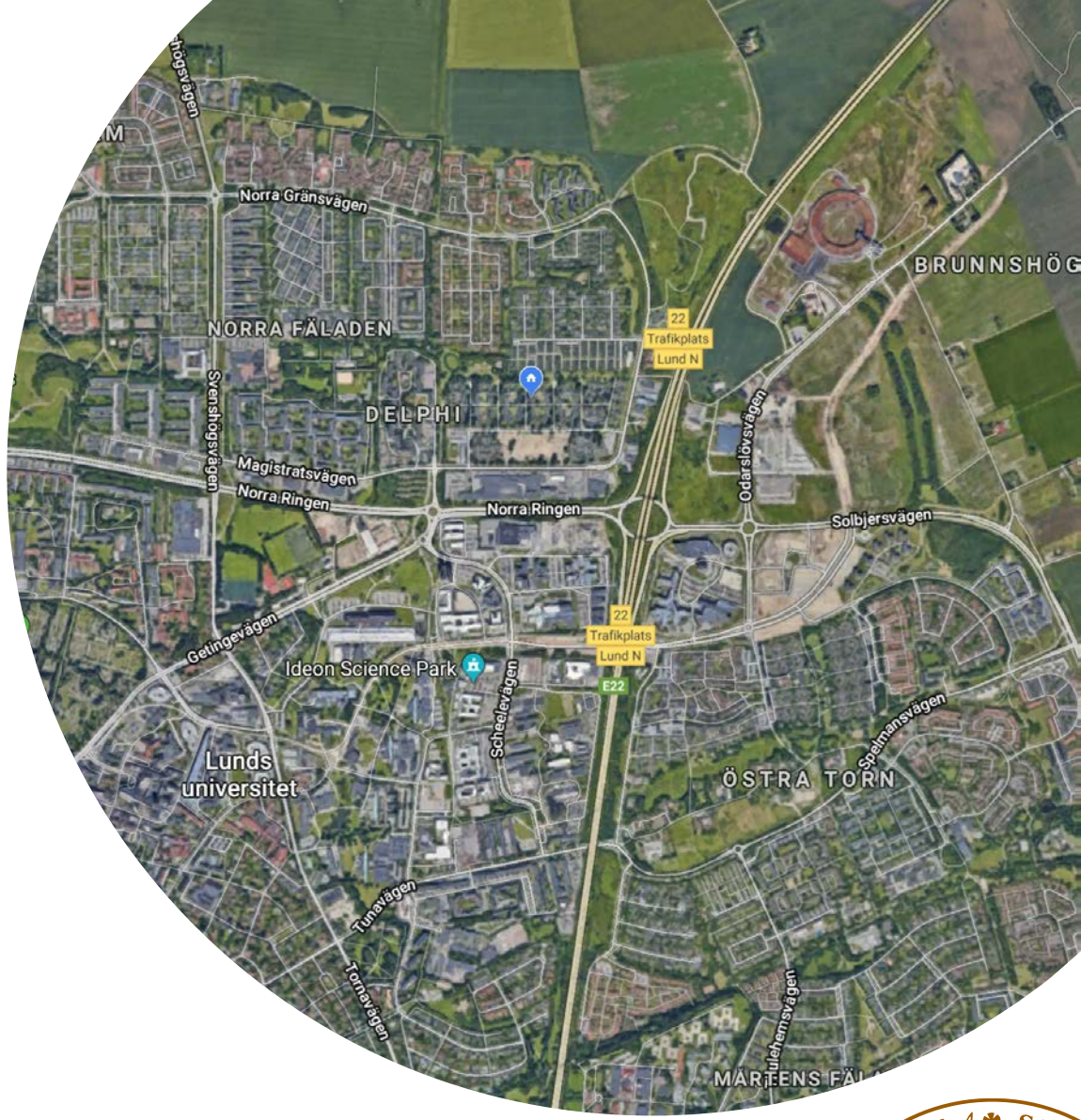
- Workflow and system developed under the lead of LUNARC (together with LBIC, RS, SUS and more)

L-SHIP (data transfer system) and LUNARC-HPC Desktop (a distributed visualisation solution)

CIPA

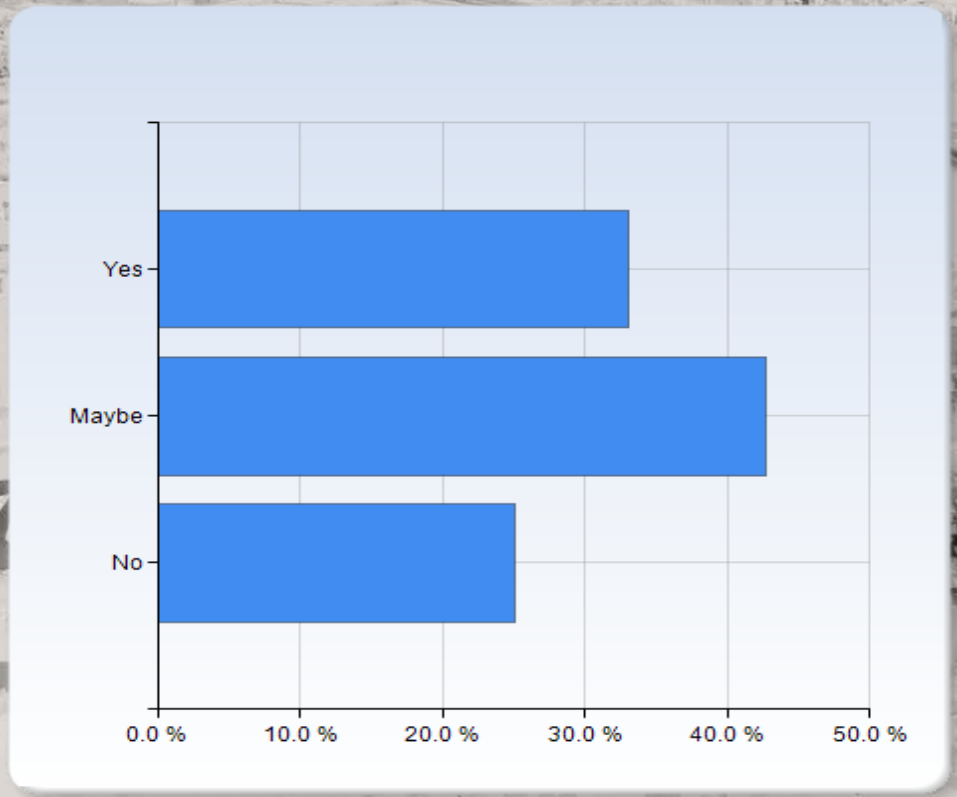
Correlative Imaging and Processing Analysis

- Based on a survey sent out by MicLU autumn 2018– things are moving fast regarding the needs for image processing and analysis!
- CIPA founded by Lund University as a cross-faculty infrastructure to meet the existing and up-coming needs within image processing and analysis (started May 2019).
- MicLU board as decision-making organ
- Not just microscopy!



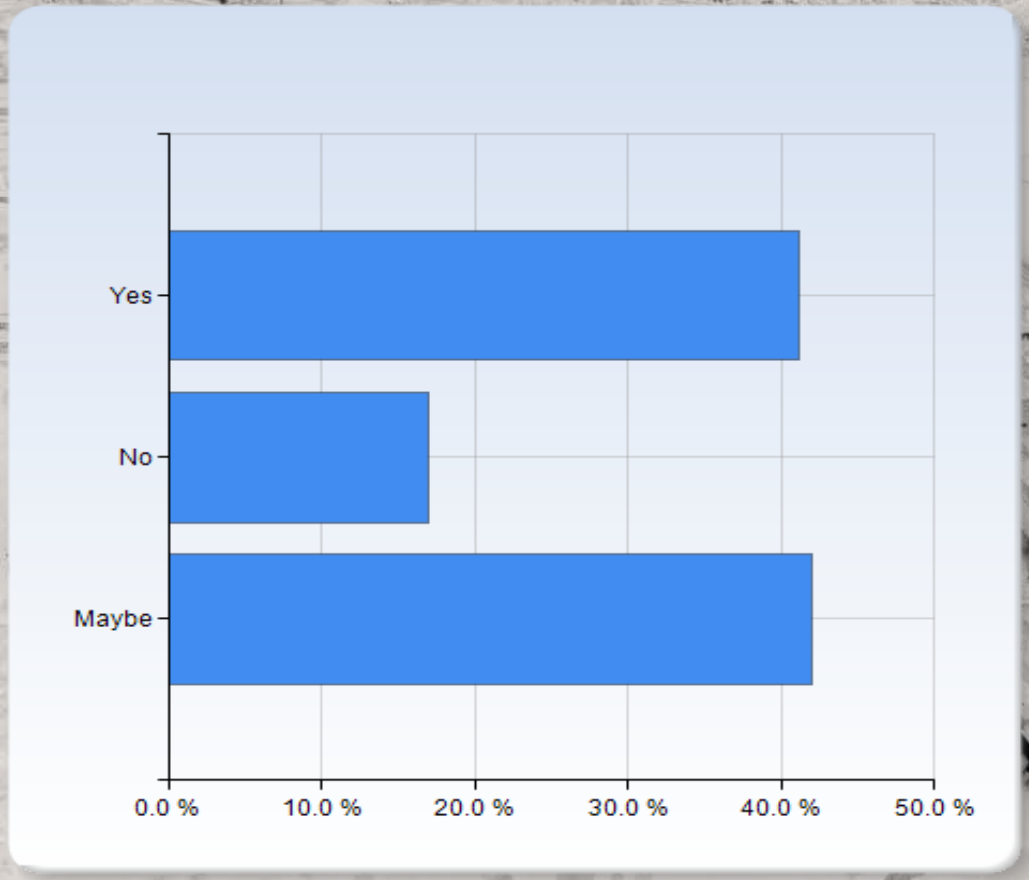
https://www.microscopy.lu.se/cipa

Do you need access to digital storage space for imaging data outside your own group?



75% Yes or maybe

Do you need access to expertise on how to handle or analyse imaging data?



83% Yes or maybe

Free comments: Image processing and analysis survey 2017

- It would be nice to have better training in image processing, for both analysis and publication purposes.
- The time spent acquiring images is far less than time spent on processing and analysis, a fact that has been overlooked in Lund. There are many microscopes in Lund but very few places were help with processing and analysis of the data can be found. An image analysis and visualisation facility linked to the existing imaging infrastructures is desperately needed in Lund. Organisation could be central but there must be nodes (people) at key locations close to the researchers that need it. This would aid greatly in establishing an imaging culture and promote Lund as a excellent place to conduct advanced imaging. There are many options to how this could be organized and funded, but the key points need to be openness and accessibility. Running regular workshops and open hours where researchers can come with their data for help with analysis would be a good start. This would also serve as an "analysis triage" were the analyst would either help the researcher directly with their question, point to a specific software that could be used for the particular problem or start a analysis project if the problem needs more work. I would be more than happy to work towards such a model.
- This is an urgent need for me and my group, shared by many at Lund University! I strongly hope there will be significant resources allocated to creating an image visualization, processing and analysis infrastructure in Lund. Not least for the single particle cryo-EM we need skilled expertise that can assist in the data analysis. Without urgent allocation of these resources Lund University will fall behind and have a very hard time to catch up with other universities in Sweden and not least elsewhere.
- I strongly hope there will be significant resources allocated to create an image visualization, processing and analysis infrastructure in Lund. Not least for the single particle cryo-EM we need skilled expertise that can assist in data analysis. Without urgent allocation of these resources, Lund University will fall behind and will have a very hard time to catch up with other universities in Sweden and internationally. We also need expertise in how to handle biological samples for single particle cryo-EM and we need to invest in at least one decent microscope for setting up and optimizing conditions before analysis at e.g. SciLifeLab singe particle cryo-EM units. Alternatively Lund University directly invests in a state of the art single particle cryo-EM, something that Lund University will have to do sooner or later anyhow. The microscope could be placed at e.g. nCHREM or LBIC and the unit could run in close connection to both LP3 (for protein purification) and the much needed and wanted Lund University visualization, processing and analysis infrastructure.
- sorry, too little time right now to check for all answers. Microscopy is still a very important method for us, and getting help with data analysis is probably the most urgent thing. I do think that for the needs of biologists in general the existing microscopes are all fine.
- Always room for improvement but I have yet never met a person from an image facility that can actually do the analysis we need.
- We are relative newcomers to single particle analysis, so it would be nice to have more local expertise in the use of the software. A local computing node with RELION installed would also be great, alternatively an installation at LUNARC.
- For single particle cryoEM some systems might be interesting for me and I do not know about their capabilities/limitations. I'm aware that an inventory exists, but finding solutions to our specific problems is a challenge still. I realize that it may be difficult to find or employ a single person or persons with expertise in all available systems and who could identify solutions every time for all potential users. A start could perhaps be to create a chat room for imaging at LU - the ”MicLU room". Something that would work (hopefully) as the platform "Research gate", where users pose a question and whoever has the expertise, time, and energy will pitch in with advice/suggestions/solutions. It could perhaps include not only BIO-imaging, but also people at LTH etc..
- We currently have group members working on developing image analysis but would benefit from additional expertise in the future.
- Specifically, statistics on image analysis
- Yes, expertise is always good. But more important mathematicians and physicist to assist in programming.
- Phyton!!!!! It is been used everywhere now...
- help with matlab
- Could be in the futute for the data processing of imaging data obtained by LA-ICP-MS
- YES. At the moment it's mostly trial and error to be fare. It would be extremely helpful to have access to expertise at the University - sometimes just to ask "simple" questions.

Where is CIPA?

BMC C14 (C1439a), drop-in hours Wednesdays 08:00-12:00

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Anders Sjöström anders.sjostrom@lunarc.lu.se

Kajsa M. Paulsson kajsa_m.paulsson@med.lu.se

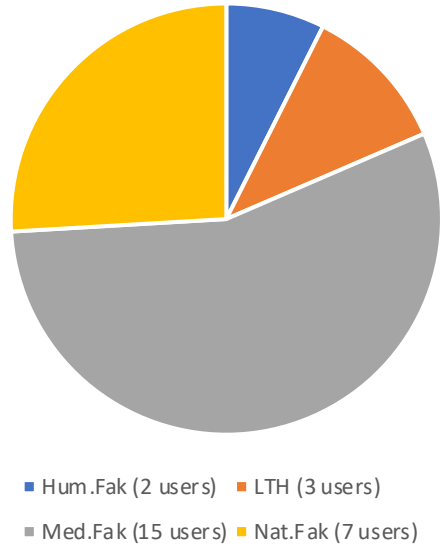
Markel Martinez-Carranza markel.martinez_carranza@med.lu.se

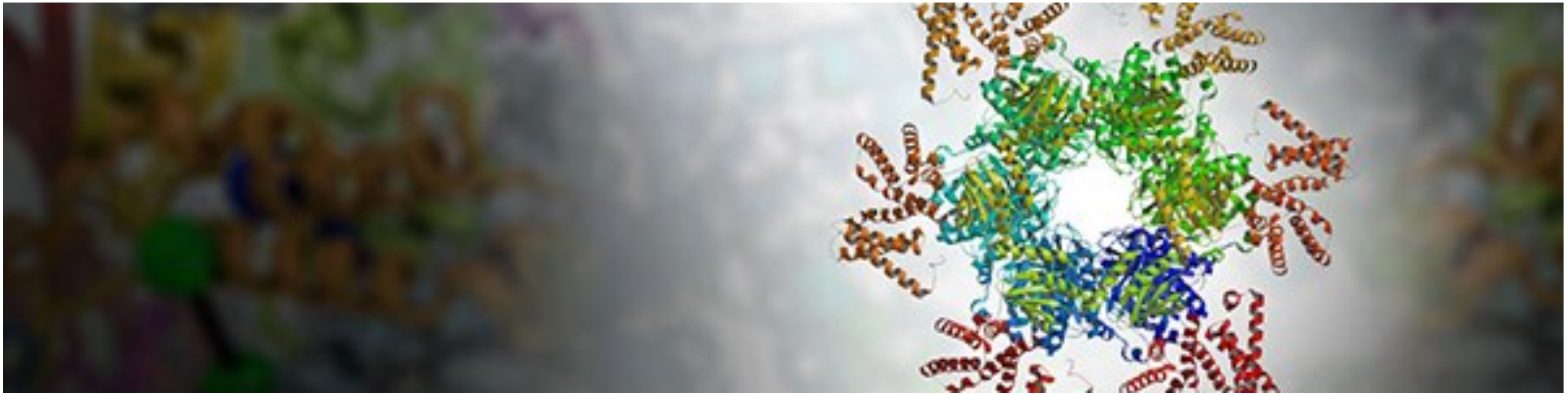
What can CIPA help you with?

- Quantitative analysis
  - Counting and feature recognition
  - Co-localization, tracking
- Automating processes (macros, custom scripts)
- Self-help (including ImageJ/FIJI)
- Access to LU supercluster and storage (LUNARC)
- Software access and support (Arivis, Imaris, Scipion, Relion etc.)

Table 1. PIs or other individual researchers that have used CIPA during the first 10 months.

Faculty	Name	Software	Area
FoHT	Danilo Marco Campanaro	Photoscan	Archaeology
FoHT	Paola Derudas	Photoscan	Archaeology
LTH	Alexandros Sopasakis	Storage	Mathematics
LTH	Håkan Ardö	Nvidia/GPU usage	Mathematics
LTH	Marcin Kozlowski	MATLAB	Structural Mechanics
FoM	Lotta Happonen	Scipion, Relion	Infection Medicine
FoM	Emil Tykesson	CryoSPARC	Matrix Biology
FoM	Olga Cozzolino	MATLAB/LUNARC	Airway Inflammation and Immunology
FoM	Niccoló Peruzzi	MATLAB Astra Toolbox	Medical Radiation Physics
FoS	Veiko Lehsten	Photoscan	Physical Geography and Ecosystem Science
FoS	Hongxiao Jin	Photoscan	Physical Geography and Ecosystem Science
FoS	Marcel Sayre	Amira, CATMAID	Functional zoology
FoS	Sovann, C. Pheaktra	Photoscan	Physical Geography and Ecosystem Science
FoS	Jonas Ardö	Photoscan/IDL	Physical Geography and Ecosystem Science
FoS	Carl Alwmark	Arivis, segment 3D print	Geology
FoS	Johan Lindgren	Arivis, segment 3D print	Geology, Paleontology
FoM	Filipe Pereira	Arivis	Molecular medicine, gene therapy
FoM	Gunilla Westergren-Thorsson	Arivis, FIJI	Molecular medicine
FoM	Sebastian Albinsson	Arivis	Molecular vascular physiology
FoM	Bo Åkerström	VivoQuant	Infection medicine
FoM	Christian Bellodi	FIJI, Arivis	Molecular Hematology
FoM	Angela Cenci Nilsson	Arivis, Imaris	Pathophysiology
FoM	Iben Lundgard	Arivis, Imaris	Molecular medicine, Glia-Immune interactions
FoM	Alejandro Garcia	Arivis, FIJI, VivoQvant	Molecular medicine
FoM	Ani Gregoryan	Arivis, FIJI, VivoQvant	Molecular medicine
FoM	Thomas Deierborg	Imaris	Medicine, Neuroinflammation





Single particle cryoEM

Need for:

- Software
- Hardware
- National network (PReSTO)

Solutions through and with LUNARC!

Thank you for listening!