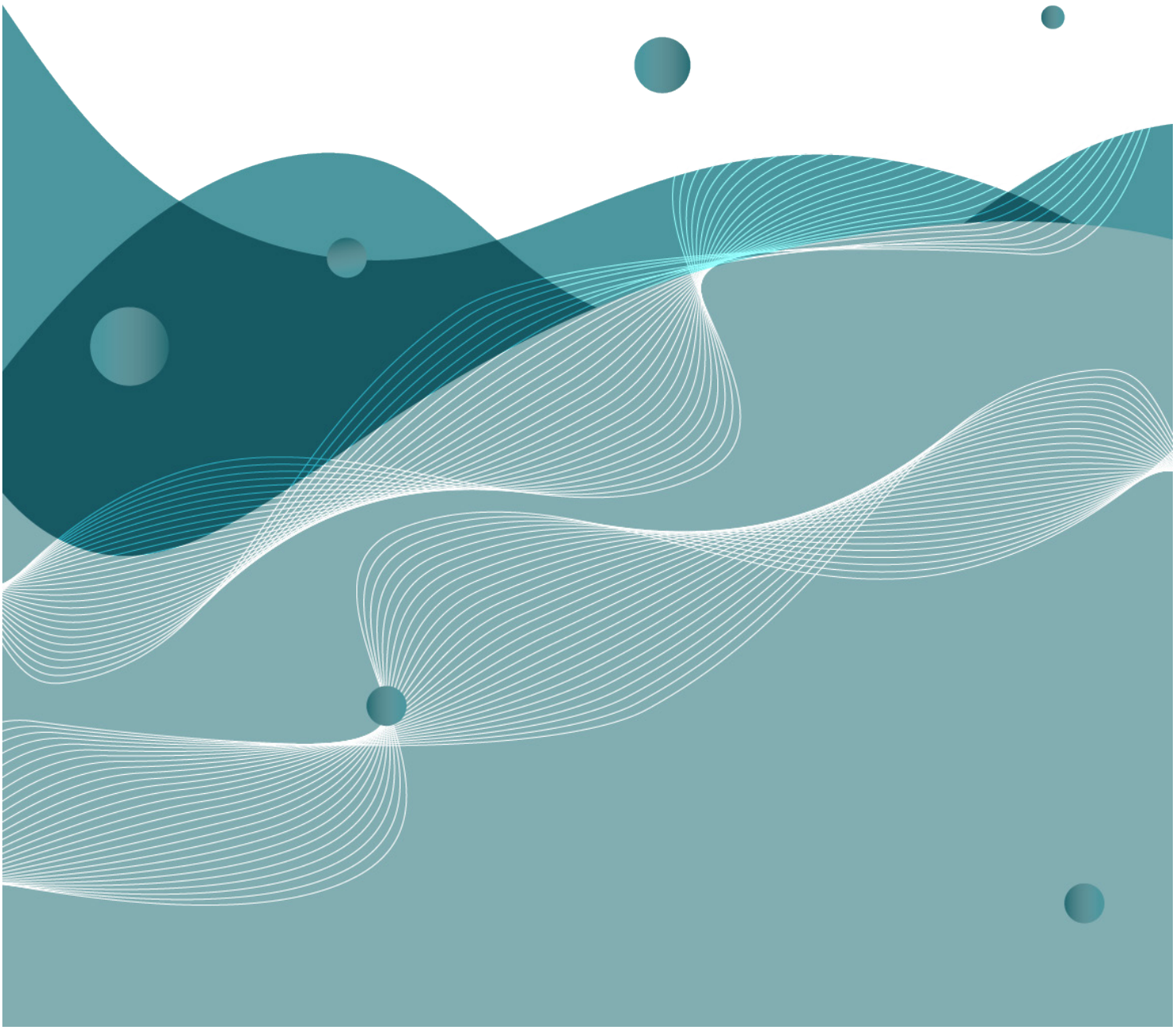
SciLifeLab

Report: SciLifeLab Technology Survey

Proposals on New Technologies and Infrastructure Units

2023



Content

Introduction

As part of the planning for the SciLifeLab infrastructure operations 2025–2028, a survey, directed broadly to the life science research community in Sweden, was open for suggestions between June 2 and August 10, 2023. Proposals could be submitted in two categories:

A) **New technologies** – proposals on new technologies, instruments, services, and technological capabilities urgently needed by the user community

B) **New infrastructure units** – proposals on existing, non-SciLifeLab, facilities (local core facilities or national infrastructure) that could potentially be included as candidate SciLifeLab Infrastructure Units in the international evaluation in 2024

In total, 47 suggestions on new technologies and 36 suggestions on new infrastructure units were submitted (see statistics on page 6-7). In this report, the proposals from the survey are compiled and color-coded as above to distinguish between the two categories. The proposals are sorted platform-wise, i.e. each proposed technology or infrastructure unit is shown under the SciLifeLab platform(s) that the submitter considered to be the most relevant recipient of the proposal. Where the submitter suggested multiple platforms, the proposal has been included under each of those platforms. The proposals for which the submitter has not proposed a specific SciLifeLab platform, are presented under the section "Proposals on Technologies/Infrastructure Units with no Specific Platform Suggested".

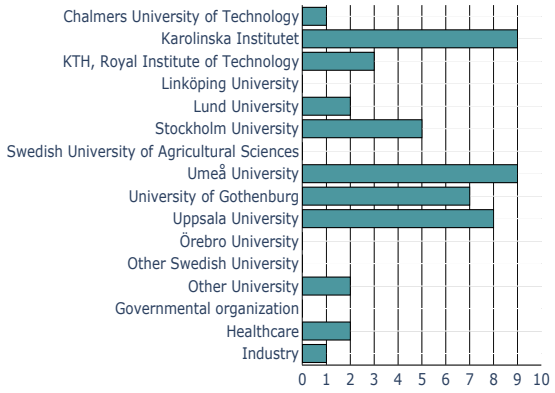
The current organization of the SciLifeLab infrastructure platforms and units is shown in Figure 1. This report will be distributed to the SciLifeLab Management Group, Site Directors, Board, Platform Management Groups, Capability Leads, and the National SciLifeLab Committee.

Figure 1. Current organization of the SciLifeLab infrastructure platforms and units

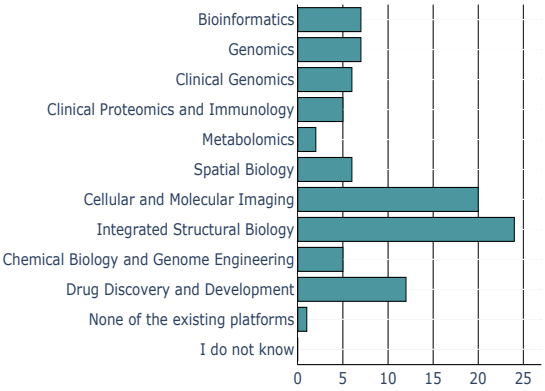
Proposals on New Technologies – a summary

Total number of proposals: 47

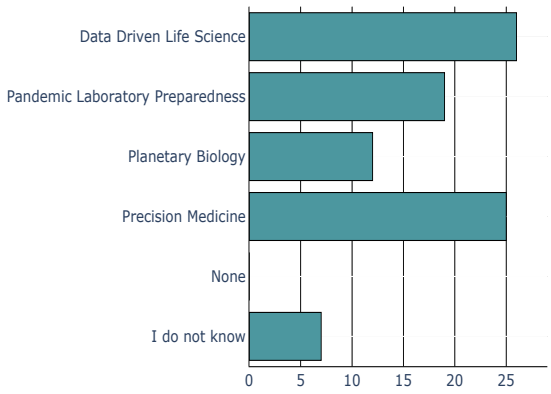
Affiliation of Proposer:



In which SciLifeLab Platform would the technology/instrument/service/technological capability fit?



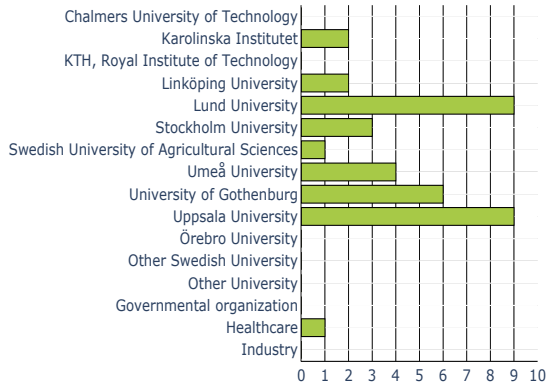
Which SciLifeLab capability/program could potentially be strengthened by the technology/instrument/service/technological capability?



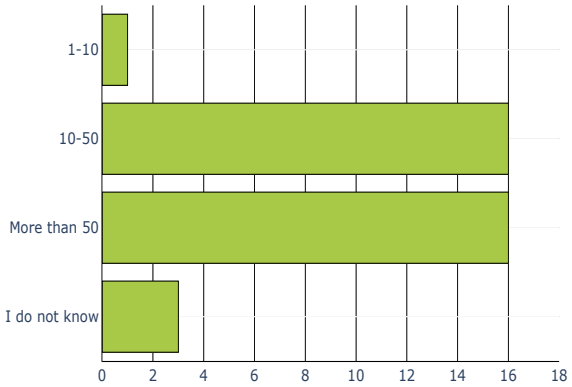
Proposals on New Infrastructure Units – a summary

Total number of proposals: 36

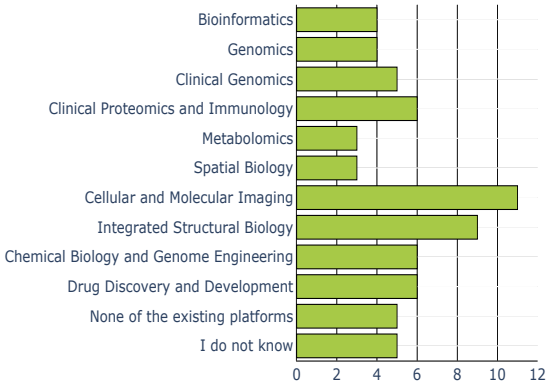
Affiliation of Proposer:



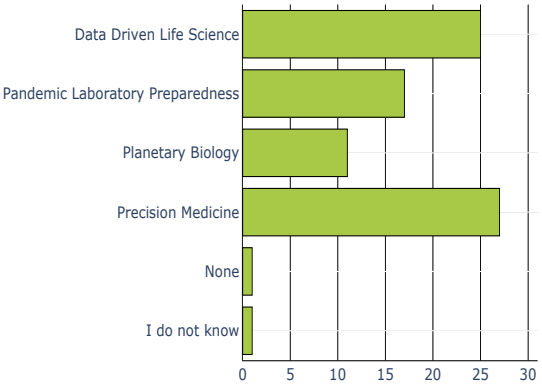
Estimated number of unique users annually if the facility/unit became part of SciLifeLab's national infrastructure:



In which SciLifeLab Platform would the facility/unit fit?



Which SciLifeLab capability/program could potentially be strengthened by the facility/unit?



Bioinformatics

Proposals on New Technologies p. 10-17

Proposals on New Infrastructure Units p. 18-24

001: A national Adaptive Immune Receptor Repertoire Resource (AI3R)

Bioinformatics

Mats Ohlin, Professor, Lund University
mats.ohlin@immun.lth.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Leaders of relevant infrastructure units in Lund)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Integrated Structural Biology
Drug Discovery and Development
Bioinformatics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Context: Studies of adaptive immune receptors (AIR) (antibodies and T cell receptors) by high-end technologies enable understanding of the complexity and functionality of AIR responses for development of therapeutics, diagnostics, and bioanalysis. A diversity of genetic, protein and bioactivity data define AIR. The complexity and nature of AIR puts specific requirements on technologies, bioinformatics, and AI/ML in such studies, e.g. for our preparedness to swiftly respond through AIR solutions to novel pandemics.

Concept: The AI3R cross-platform initiative will use and develop existing competence and integrate infrastructures' capabilities specifically for studies of AIR.

AI3R vision: To be an integrated resources to promote AIR research.
AI3R mission: To enable high quality AIR research by a diversity of teams in Sweden.

AI3R will develop and guide research through integrated competences of existing local and national infrastructures, such as

• U-READ for antibody development / integration with SciLifeLab DDD capabilities,
• CTG/NGI to enable gene-based AIR research,
• BioMS to enable protein-based AB discovery,
• PPS for protein production,
• Structural Proteomics and Cryo-EM/LU to define AIR binding,
• The Lund University Virus Centre to provide functional AIR analysis in pandemic contexts,
• NBIS to enable AIR analysis through bioinformatic, AI and ML capabilities.

Impact: AI3R will enable AIR discovery to promote human health.

Estimated annual total funding (MSEK) needed from SciLifeLab:

3 M SEK for 2 FTE staff to be distributed across different existing national (e.g. NBIS, DDD, BioMS, Structural Proteomics, NGI, Cryo-EM) and local (e.g. U-READ, CTG, LU Virus Centre) infrastructure platforms to provide know-how for studies of AIR in a variety of experimental and analytical situations and to integrate different platforms, capabilities with a focus of AIR studies.

Additional comment:

None

002: Computational Analytics Support Platform (CASP) – data analytics service for life science researchers

Bioinformatics

Hans Stenlund, Acting Head of Unit (PhD), Umeå University
hans.stenlund01@umu.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers, Infrastructure (Swedish Metabolomics Centre (SMC))

The technology would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology
Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Drug Discovery and Development
Bioinformatics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, Computational Analytics Support Platform (CASP), Umeå University

Brief description of the technology:

The ability to analyse and draw valid conclusions from complex data sets, generated by high-throughput technologies, has become a bottleneck for many life science researchers. The shortage of skills required to analyse this flood of data has been recognised on both a national and local level.

To help bridge this gap locally, CASP was launched in 2021 at Umeå University, to primarily support but also train life scientists in the analysis of experimental data. CASP has supported a constant flow of researchers, both locally and nationally, from primarily academic, but also industrial settings.

CASP provides a unique set of tools primarily within multivariate data analysis, but also as relevant, AI/deep learning, pathway analysis, univariate statistics and statistical experimental design. These methods are applied to data from multiple technologies (e.g. metabolomics, proteomics, spectroscopy, imaging), contributing to CASP's diverse customer base from areas spanning disease diagnostics, infection biology, agriculture and environmental toxicology.

CASP also acts as a valuable extended support to the Swedish Metabolomics Centre (SMC), supporting users with the analysis and biological interpretation of data, both vital stages where users often require support and was previously difficult to find. CASP also supports the Vibrational Spectroscopy Core Facility and hopes to extend this to other SciLifeLab units i.e. Exposomics who have shown an interest in their service.

Estimated annual total funding (MSEK) needed from SciLifeLab:

CASP would require annual funding of 1 MSEK from SciLifeLab, to cover the salary costs of one member of staff dedicated to service.

Co-funding plans:
Support from Umeå University (including the Chemical Biological Centre):
2023-2024 – received 1.8 MSEK after being recognised as an infrastructure with potential to become of national interest
2025+ (estimate ~500 KSEK/year)

Future applications:
VR for research infrastructures of national interest (6 years funding (50% of total budget))
KAW – Proof of Concept Grant Program (2 years, 1-4 MSEK)

Income from user fees (estimate ~1 MSEK/year)
At present, user fees account for more than 50% of CASP's total revenue presenting CASP as a cost-efficient platform
Income from collaboration partners (estimate ~400 KSEK)

Additional comment:

Interdisciplinary expertise, domain expertise in both technology and life sciences, adds to the uniqueness of CASP, allowing support that goes

002: Computational Analytics Support Platform (CASP) – data analytics service for life science researchers (cont.)

Hans Stenlund, Acting Head of Unit (PhD), Umeå University
hans.stenlund01@umu.se

***Please note that this proposal is also found under other platforms*

beyond data analysis into the biological understanding of data. Their focus is on the analysis of biology readouts – phenotypic/non genomic data, making CASP complementary to bioinformatics support available at NBIS and the UPSC Bioinformatics Facility, who CASP hope to work alongside and together provide a strong support to the life science community.

003: Deep Learning Support Infrastructure

Bioinformatics

Arne Elofsson, Prof, Stockholm University
arne@bioinfo.se

Representing:

An individual researcher

The technology would fit in the SciLifeLab Platform(s):

Bioinformatics

The suggested technology would contribute to following capabilities:

Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Unfortunately, the capability of NBIS today to provide state-of-the-art support for deep learning technologies is severely limited as they have not recruited people with the right skills. There is a real need for help writing modern machine learning code using JAX, PyTorch-lightning and other tools enabling efficient use of Berzelius and other multi-GPU platforms.

Recruitment of this type of expert is hard. We do believe that the best option is to collaborate closely with the universities that teach computer science (KTH, Chalmers, LiU etc) and use their set of highly skilled master students as project workers might be an efficient strategy that has not been examined yet. We propose to hire one full time "supervisor" whose job is to both work on interesting project as he/she seems fit, but primarily to supervise about 10 master students employed on short time (3 month) projects at various universities around Sweden.

Estimated annual total funding (MSEK) needed from SciLifeLab:

One supervising expert would cost about 1.5 MSEK including everything. THen hiring 10 masters students at 25% would probably cost 3 MSEK.

Additional comment:

None

004: Development of analytical methods for non-model organisms

Bioinformatics

Olga Vinnere Pettersson, PhD, Uppsala University
olga.pettersson@scilifelab.uu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Planetary Biology Capability)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Bioinformatics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Planetary Biology
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

PB has conducted its own survey among its target community. Results suggest that the majority of technologies required to satisfy PB community needs are already present in SciLifeLab infrastructure. The main limitation, however, is that most of the applications are tailored to model organisms, or mammals only. The community seeks method/service development mainly from Genomics, Bioinformatics & Spatial Biology platforms.
Several service improvement suggestions have been made by the community.
Below we name a few, in order of significance:
-Genomics
Construction of cheap multiplex shotgun libraries for large-scale population genomics & metagenomics
Expanding capacity for making amplicon-based sequencing libraries for large-scale metabarcoding
Expanding DNA/RNA extraction service from non-models, as well as environmental samples; automatization of this service
Construction of genomics & epigenomics libraries from recalcitrant biological samples
Preserving microbial single-cell service
Increasing knowledge transfer with NGI regarding method development
-Bioinformatics
Development of new tools & pipelines for analysis of population-, metagenomic & transcriptomic sequencing data of non-models
Service & support in data preparation for, and submission to data repositories
Genome browser production for non-models
-Spatial Biology
Enabling application of spatial transcriptomics and proteomics to non-mammalian samples
-Metabolomics
Develop/extend reference libraries

Estimated annual total funding (MSEK) needed from SciLifeLab:

The PB recommendation is to focus on service/technological capability development: not to acquire new instrumentation, but to increase the number of FTEs at the existing facilities. Expansion of the current services to non-models will enable researchers to conduct high-impact research, but it requires hands-on development. The existing technological strength combined with strategic investment in human resources to conduct non-model technology R&D;, will allow SciLifeLab to pioneer method development in several areas. Users demand training from the technology platforms, but are also happy to share their know-hows with the infrastructure.

We suggest additional investigation into the necessary number of FTEs per each of aforementioned technology platforms to meet the PB community needs.

Additional comment:

This summary is based on discussion outcomes during the PB kick-off meeting, its follow-up, SciLifeLab day in Göteborg, as well as the PB-initiated survey of current SciLifeLab technologies and services circulated amongst Swedish researchers (including DDLS fellows).

Collection of survey responses is still ongoing and PB will prepare a report to the Management Board upon completion in this fall.

005: Preclinical Multimodal Imaging Systems (PMIS)

Bioinformatics

Eva Forssell-Aronsson, Professor, University, Health care, Sahlgrenska University Hospital
eva.forssell_aronsson@radfys.gu.se

***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher, A group of researchers, Infrastructure (Sahlgrenska Bioimaging Center, ca 30 groups)

The technology would fit in the SciLifeLab Platform(s):

Spatial Biology
Cellular and Molecular Imaging
Drug Discovery and Development
Bioinformatics

The suggested technology would contribute to following capabilities:

Precision Medicine

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Precision medicine is rapidly evolving and state-of-the-art pre-clinical imaging infrastructures are critical to accelerate translational research and clinical implement. Access to Next-Generation imaging systems that enable simultaneous acquisition from several imaging modalities in longitudinal studies is a current gap in research infrastructure in Sweden.

We have secured funding for a state-of-the-art Pre-clinical Multimodal Imaging System (PMIS) with MRI (magnetic resonance imaging), PET (positron emission tomography), SPECT (single photon emission tomography), and CT (computer tomography), and functional ultrasound (US). The imaging infrastructure will be nationally unique and internationally competitive with MRI, PET, SPECT and CT delivered by the same vendor, enabling simultaneous acquisition from two image modalities and the possibility of subsequent imaging in the same position with the other modalities. This enables true multimodality imaging in order to fully correlate imaging data from all four modalities. Furthermore, the US system is unique in Sweden and has very high sensitivity and spatiotemporal functional resolution with real-time imaging possibility.

The new PMIS at SBIC will attract a broad user base across academia, healthcare and industry nation-wide. Multimodality imaging is crucial for localisation of biomarker expression, in drug development and other types of translational research and helps to bridge the gap from research to clinical routine.

Estimated annual total funding (MSEK) needed from SciLifeLab:

The new cutting-edge imaging technology (PMIS) will be part of SBIC at Experimental Biomedicine (EBM), within Core Facilities (CF) at University of Gothenburg. SBIC will be fully integrated with CFs well established, open access research, with a vast experience in successfully running national research infrastructures. We seek funding of salary costs to enable the platform to operate as a national infrastructure within SciLifeLab. This includes a Platform Scientific Director (20% FTE, 0.38 MSEK), a Platform Manager (50%FTE, 0.59 MSEK) and an administrative support (20%FTE, 0.18 MSEK), at a total cost of ~1.1 MSEK annually.

Additional comment:

The Bioimaging Center at EBM was founded in 2002 as part of the SWEGENE project - a regional infrastructure in the South-West of Sweden, and later continued as a local infrastructure for researchers in academia, healthcare and industry in the Gothenburg area.

The procurement of the new state-of-the-art PMIS described here is in late phase. The eqiopment will be installed in the refurbished imaging facility at EBM during 2024.

006: PReSTO for integrated structural biology

Bioinformatics

Martin Moche, Senior Lab Manager, Karolinska Institutet
martin.moche@ki.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Protein Science Facility)

The technology would fit in the SciLifeLab Platform(s):

Integrated Structural Biology
Bioinformatics

The suggested technology would contribute to following capabilities:

I do not know

Is the technology currently available as local infrastructure service in Sweden?

Yes, PReSTO is available at NSC Tetralith/Berzelius, LUNARC Cosmos and the MAX IV cluster

Brief description of the technology:

The PReSTO project makes structural biology software available in the high-performance-compute (HPC) environments of the National Academic Infrastructure for Supercomputing in Sweden (NAISS) and local MAX IV cluster (www.nsc.liu.se/support/presto/index.html). PReSTO started in 2013 as an outreach activity of the National Supercomputer Center (NSC) in Linköping, funded by MAX IV as a satellite from 2015 – 2018, and by the Swedish Research Council 2018-2022. Structural biology evolved by photon-counting detectors, fourth generation light sources and free electron lasers for room temperature time-resolved crystallography now requires programmable GPUs for data analysis. PReSTO make use of Thinlinc, Gitlab and Easybuild to create an optimal and unique user experience by many adaptations and patches to the PReSTO software like making forkxds and CryoSPARC aware of SLURM scheduling (Simple Linux Utility for Resource Management).
In 2022, a structural biology course organized by Lund University, the integrated structural biology course organized by InfraLife, and the MicroMAX summer school organized by MAX IV were all using PReSTO. NSC Berzelius, a new NVIDIA SuperPOD with 60 DGX-A100 compute nodes, is available for SciLifeLab cryo-EM data processing via PReSTO.

The PReSTO project connects SciLifeLab to MAX IV via NAISS and can be added to the Integrated Structural Biology (ISB) platform or to the National Bioinformatics Infrastructure Sweden (NBIS) platforms of SciLifeLab.

Estimated annual total funding (MSEK) needed from SciLifeLab:

PReSTO involves staff from NAISS, MAX IV, SciLifeLab cryo-EM, and the Swedish structural biology community and require 4 MSEK per year for 4 full-time equivalents (FTEs).
– 2 FTE at NSC
– 0.5 FTE for Serial Synchrotron X-ray crystallography (SSX)
– 0.5 FTE for cryo-Electron Microscopy (cryo-EM)
– 0.5 FTE for Nuclear Magnetic Resonance (NMR)
– 0.5 FTE for Macromolecular X-ray crystallography (MX)
Staff from NSC has a leading role in PReSTO by performing project management, making first installs at NSC Tetralith, NSC Berzelius, LUNARC Cosmos and the MAX IV cluster and managing the GitLab repository. Community staff assigned by NSC perform software updates, online documentation, software testing and training of fellow scientists. Small-Angle X-ray/Neutron Scattering people wanted.

Additional comment:

The NSC competence has been recognized when the KAW (Knut and Alice Wallenberg Foundation) granted funding for SuperPOD resource Berzelius to NSC in 2021, when the Swedish Universities replaced SNIC (Swedish National Infrastructure for Computing) with NAISS in 2022, and when the EuroHPC JU (European High Performance Computing Joint Undertaking) granted funds for NSC Arrhenius in 2023 (https://liu.se/nyhet/europeisk-superdator-hamnar-pa-liu). Commercial licenses for PReSTO use are discussed.

007: Working chain for cancer related questions

Bioinformatics

Mischa Woisetschläger, Dr, Health care, Radiology department Linköping
mischa.woisetschlager@regionostergotland.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Group of diff specialties with cancer research)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Clinical Proteomics and Immunology
Integrated Structural Biology
Bioinformatics

The suggested technology would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

I do not know

Brief description of the technology:

We would love a working chain for the handling of cancerspecific projects with the integration of images, genetic, journal information with regards to big data handling, radiomics and AI.

Estimated annual total funding (MSEK) needed from SciLifeLab:

3 000 000 SEK

Additional comment:

None

008: Computational Analytics Support Platform (CASP)

Bioinformatics

Kate Bennett, Platform Manager (PhD), Umeå University
katie.bennett@umu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Computational Analytics Support Platform (CASP))

The facility would fit in the SciLifeLab Platform(s):

Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Clinical Proteomics and Immunology
Drug Discovery and Development
Bioinformatics

Facility location:

Umeå University

Contact person for the facility:

Dr Kate Bennett

Contact person email address:

katie.bennett@umu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

The Computational Analytics Support Platform (CASP) is a data analytics service at Umeå University that primarily supports, but also trains life scientists in the analysis of experimental data, helping researchers unravel complex chemical and biological systems.

Since the platform began in 2021, CASP has supported researchers locally and nationally from diverse research backgrounds including health and disease, environmental toxicology, pharmaceuticals, agriculture and infection biology. CASP also acts as a valuable support to the Swedish Metabolomics Centre, supporting users with both the analysis and biological interpretation of data.

Their focus is on the analysis of phenotypic/non-genomic data from a wide range of technologies including, but not limited to, downstream omics (metabolomics/proteomics), spectroscopy and imaging. CASP provides researchers with advanced data-driven tools and strategies primarily within multivariate data analysis, but also AI/deep learning, univariate statistics, pathway analysis and statistical experimental design.

The uniqueness of CASP arises from their interdisciplinary nature. Combined, the group have strong expertise in data-driven life science, not only understanding statistics and modelling, but have wide domain knowledge arising from active engagement in numerous projects particularly in the ‘omics’ area and beyond. This allows for a full understanding of the researcher’s needs, not only in terms of the data analysis, but also in how the data was generated and equally important, the interpretation of the biology behind the project. Support can be provided from day one starting with experimental design, quality control of generated data, basic to in-depth data analysis, through to interpretation of results and publishing.

CASP’s mission is to help bridge the existing gap in data-driven life science by continuing to provide a valuable and much needed support to the life science community in Umeå and beyond.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility, Providing services to researchers primarily from Umeå University and other Swedish Universities.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

CASP would require annual funding of 1 MSEK from SciLifeLab, to cover the salary costs of one

Kate Bennett, Platform Manager (PhD), Umeå University
katie.bennett@umu.se

***Please note that this proposal is also found under other platforms*

member of staff dedicated to service.

Co-funding plans:

Support from Umeå University (including the Chemical Biological Centre):
2023-2024 – received 1.8 MSEK after being recognised as an infrastructure with potential to become of national interest
2025+ (estimate ~500 KSEK/year)

Future applications:
VR for research infrastructures of national interest (6 years funding (50% of total budget))
KAW – Proof of Concept Grant Program (2 years, 1-4 MSEK)

Income from user fees (estimate ~1 MSEK/year)
At present, user fees account for more than 50% of CASP's total revenue presenting CASP as a cost-efficient platform
Income from collaboration partners (estimate ~400 KSEK)

Additional comment:

CASP aims to provide researchers with services and expertise complementary to those offered by existing bioinformatics support platforms including the SciLifeLab Platform NBIS. Together, CASP aims to contribute to a stimulating work environment within the DDLS Data area node, which will be hosted at UmU, with CASP fitting perfectly in to three of the strategic DDLS research areas; Epidemiology and Biology of Infection, Cell and Molecular Biology and Precision Medicine and Diagnostics.

009: LU-Fold

Bioinformatics

Gemma Atkinson, Dr, Lund University
gemma.atkinson@med.lu.se

***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher, A group of researchers, Infrastructure (LU Fold facility at Lund University, and my group)

The facility would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Cellular and Molecular Imaging
Integrated Structural Biology
Bioinformatics
I do not know

Facility location:

Lund University

Contact person for the facility:

Gemma Atkinson

Contact person email address:

gemma.atkinson@med.lu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

LU-Fold is a new Lund University-based facility for helping researchers predict protein structures of interest using the cutting-edge method AlphaFold2 (Nature Methods method of the year, 2021). LU-Fold specialises in high-throughput prediction of protein complexes to predict novel protein-protein interactions. For example, we can predict pairwise interactions of a protein of interest with all other proteins in a proteome to find new binding partners and molecular binding interfaces.

We run as a service, using national high performance computing infrastructure to make high-throughput structural predictions. Users do not have to have any previous bioinformatics or structural biology experience.

Our services include prediction of:
– pairwise binding interactions of a protein of interest with all other proteins in a proteome
– structures of all proteins in a proteome (for instance from a newly sequenced genome)
– higher order structures of larger complexes
– the effects of mutations and truncations on proteins

We also offer training through workshops, tutorials and online guides to help others make predictions, compare structures, visualise results and make publication-quality figures.

This novel service was urgently needed and is receiving significant interest. The facility officially starts in August 2023, and until then the Atkinson lab has been initiating pilot projects within the scope of local and national collaborations. So far we have been collaborating on projects that e.g. find interactions of virus proteins with the human proteome, predict oligomers of bacterial cell division proteins, discover binding partners of proteins associated with childhood cancer neuroblastoma, and predict interactions of proteins involved in neurological disorders. We have made connections with researchers at MAX IV, and the SciLifeLab Cryo-EM and Structural Proteomics units in Lund, who see ample opportunities for partnership and knowledge sharing.

How is the facility providing infrastructure services today?

As a local core-facility, Currently funded solely by Lund University

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

The major cost is salaries as we do not rely on very expensive local equipment and consumables. Currently we have one engineer serving Lund University alone. To offer the service nationally, we

Gemma Atkinson, Dr, Lund University
gemma.atkinson@med.lu.se

***Please note that this proposal is also found under other platforms*

would need at least one more staff member, plus at least a 20% director position. Overhead, rent and small running costs are additional budget expenses. As a rough estimate, the total cost of a (minimal) national LU-Fold facility would be between 3 and 3.5 million per year.

We predict it would take a SciLifeLab investment of at least around 1.5-2 million per year to make LU-Fold nationally available. This assumes LU-Fold funding from Lund University remains the same at around 1 million per year, plus some cost recovery with user fees (potentially around 600 000 per year).

Additional comment:

SciLifeLab support of LU-Fold would strategically benefit both entities. For LU-Fold, the additional investment would aid sustainability and ability to help more researchers. For SciLifeLab, with LU-Fold's connection to structural biology, proteomics, genetics, and bioinformatics, there is significant added value, with many opportunities for synergies and integration with other existing SciLifeLab platforms. Education and training activities could be integrated with the SciLifeLab Training hub.

010: ProLinC

Bioinformatics

Gunhild Maria Selander Sunnerhagen, professor, Linköping University
maria.sunnerhagen@liu.se

***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher, A group of researchers, Infrastructure (The ProLinC Biophysics Infrastructure in MOSBRI.eu)

The facility would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology
Bioinformatics

Facility location:

Linköping University

Contact person for the facility:

Maria Sunnerhagen, Dean Derbyshire

Contact person email address:

maria.sunnerhagen@liu.se

Current number of unique users annually:

10-50, More than 50

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

The LiU core facility ProLinC (liu.se/en/research/prolinc) is the Swedish node in the Horizon-2020 Molecular-Scale Biophysics Infrastructure that includes 13 academic state-of-the-art core facilities across Europe (mosbri.eu/partners/). ProLinC is a stakeholder in the SciLifeLab Integrated Structural Biology platform (ISB), and its NMR resource form part of SwedNMR (VR-infra). ProLinC at LiU uniquely offers a dedicated user facility including staff scientist support, making it possible for SciLifeLab users to fully explore their protein/complex properties and refine conditions for downstream applications, as well as explore the nature and dynamics of its interactions. ProLinC holds a near-complete set of instrumentation for the biophysical analysis of proteins and their interactions, quality assessment of biologics, and high-end fluorescence microscopy including hyperspectral options. ProLinC actively sustains transnational access (TNA) through MOSBRI as well as joint research activities in protein/peptide molecular studies and its applications within cancer, regenerative medicine and neurodegenerative and infectious diseases. When needed, our research environment fulfils Biosafety requirements for prion research. The main added value provided by ProLinC rests in the joint facile access to complementary and advanced biophysical techniques and to competence in their use, which is much appreciated by both academics and industry. Within SciLifeLab ISB, ProLinC provides user training in complementary biophysical techniques for protein QC as well as functional investigations. ProLinC actively supports WCMM users and provides essential data for AI-based protein structure and docking in the DDLS program. ProLinC has received supported by VR, SFF and ILL in maturing biomedical projects for neutron analysis using advanced pre-analysis by biophysical tools, thereby facilitating access for Swedish biomedicine to X-ray and neutron as well as cryo-EM and NMR infrastructures.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility, As a European and local infrastructure facility in Biophysics, and as part of a national facility for NMR (SwedNMR, the ProLinC NMR part only).)

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Today, ProLinC user access is enabled by combined LiU support and LiU user fees (since 2018, lims.ifm.liu.se) to primarily serve users at LiU and in the national WCMM and DDLS research networks where LiU is engaged. During 2022-2025, European access to ProLinC is fully supported by MOSBRI.eu. Today, national and industry users have to pay full cost coverage since 50% of staff and running costs are co-funded by LiU. To offer nation-wide service at LiU-level service fees, an annual SciLifeLab co-funding at

Gunhild Maria Selander Sunnerhagen, professor, Linköping University
maria.sunnerhagen@liu.se

***Please note that this proposal is also found under other platforms*

1.2 MSEK/yr is needed for staff/head-of-unit support and extra maintenance and service costs. Integration of ProLinC in SciLifeLab will enhance its node synergies (below) and ensure a continued, funding-competitive Swedish Biophysics platform in upcoming EU infrastructure programs.

Additional comment:

SciLifeLab ISB and Protein Production Sweden (PPS, VR) have jointly identified the need for supported, national user access to ProLinC for advanced protein QC, to meet required sample quality for downstream analysis (X-ray/Neutron, cryo-EM, NMR and other) and upcoming publication standards (https://p4eu.org/protein-quality-standard-pqs/). Full integration of ProLinC in SciLifeLab will facilitate exploring novel synergies between SciLifeLab nodes and with DDLS and WCMM research platforms.

011: X-Ray Diffraction Facility

Uwe Sauer, Assoc. Prof., Umeå University
uwe.sauer@umu.se

Bioinformatics

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (X-Ray Diffraction Facility (XRDF), KBC UmU)

The facility would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology
Drug Discovery and Development
Bioinformatics

Facility location:

Chemical Biology Centre KBC & Dept. of Chemistry, Umeå Univ.

Contact person for the facility:

Dr. Uwe Sauer

Contact person email address:

uwe.sauer@umu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

Since 2008 the X-Ray Diffraction Facility (XRDF) operates at the Chemical Biology Center (KBC) and the Dept. of Chemistry, UmU (https://www.umu.se/en/research/infrastructure/x_ray_diffraction_facility/). It collaborates with the Protein Expertise Platform (PEP, UmU), a node of the Protein Production Sweden (PPS) National infrastructure for protein production.
Services provided: nano-drop robotic crystallization screens; optimization of crystal growth; screening of drug fragments and drug candidates by co-crystallization (in collaboration with CBCS Umeå/KI); cryo crystal preservation and storage in liquid nitrogen; in-house diffraction optimization (resolution and intensities); full cryo-diffraction data collection incl. data processing, 3D crystal structure determination, refinement and validation; deposition of coordinates with the Protein Data Bank (PDB) or the Cambridge Structural Database (CSD). Also, the XRDF can be used for powder and fiber diffraction. The XRDF offers user training for all local equipment.
In collaboration with the Umeå cryo-EM facility (UCEM, SciLifeLab), we provide access to microcrystal electron diffraction (microED) data collection. Further, the XRDF assists with synchrotron preparations, shipments and data collection (e.g. at MAX-IV, Lund), and with Neutron diffraction experiments at the European Spallation Source (ESS, Lund).
Equipment: mosquito robot (SPT LabTech), RockImager1000 (Formulatrix) for automated crystal imaging. Remote image access via a RockMaker Web interface. Fromulator (Formulatrix) liquid handling robot to optimize crystallization set-ups. A high brilliance X-ray source (X8 PROTEUM, Bruker AXS) for in-house data collection with a fine-focused, monochromatic X-ray beam at a wavelength λ = 1.54 Å (Cu- Kα radiation). A CryoStream 700 (Oxford) system to maintain the crystals at 100K during data collection. To our knowledge, this is the only active Swedish academic in-house protein X-ray equipment.

How is the facility providing infrastructure services today?

As a local core-facility, The XRDF is maintaining the crystallization and X-ray diffraction systems and carries out services upon user demand. So far, the XRDF provides the above mentioned services mainly to about 30 researchers associated with the Integrated Structural Biology network at Umeå university and SLU.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Estimated annual funding needed: 2.3 MSEK (see below)
1.5 MSEK (1.5 FTE)
0.3 MSEK (rent)
0.5 MSEK (consumables, service, running costs)

Uwe Sauer, Assoc. Prof., Umeå University
uwe.sauer@umu.se

***Please note that this proposal is also found under other platforms*

Income:
Dept. of Chem.: 0.18 MSEK (0.2 FTE)

Rent, instrument running costs and consumables amounts to about 0.5 MSEK per year. Costs are covered mainly by user fees. Together with the equipment worth many millions in purchase value, this would represent the co-funding for a SciLifeLab-incorporated platform. In order to be able to offer national services within our current capabilities and to meet future needs (microED, MAX-IV and ESS), we would require 1.5 FTE, requiring 1.5 MSEK per year from Scielifelab.

Additional comment:

Two other PPS members, LP3 in Lund and PSF at KI, also have capabilities for crystallization and 3D structure determination. Together, we see opportunities to join forces when entering the SciLifeLab ISB platform and to together providing expertise and local direct access to protein crystallography environments.
The XRDF at Umeå Univ., with its unique X-Ray generator, will provide data collection opportunities in the North of Sweden, thus complementing MAX-IV.

Genomics

Proposals on New Technologies p. 28-34

Proposals on New Infrastructure Units p. 35-41

012: A national Adaptive Immune Receptor Repertoire Resource (AI3R)

Genomics

Mats Ohlin, Professor, Lund University
mats.ohlin@immun.lth.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Leaders of relevant infrastructure units in Lund)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Integrated Structural Biology
Drug Discovery and Development
Bioinformatics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Context: Studies of adaptive immune receptors (AIR) (antibodies and T cell receptors) by high-end technologies enable understanding of the complexity and functionality of AIR responses for development of therapeutics, diagnostics, and bioanalysis. A diversity of genetic, protein and bioactivity data define AIR. The complexity and nature of AIR puts specific requirements on technologies, bioinformatics, and AI/ML in such studies, e.g. for our preparedness to swiftly respond through AIR solutions to novel pandemics.

Concept: The AI3R cross-platform initiative will use and develop existing competence and integrate infrastructures' capabilities specifically for studies of AIR.

AI3R vision: To be an integrated resources to promote AIR research.
AI3R mission: To enable high quality AIR research by a diversity of teams in Sweden.

AI3R will develop and guide research through integrated competences of existing local and national infrastructures, such as

• U-READ for antibody development / integration with SciLifeLab DDD capabilities,
• CTG/NGI to enable gene-based AIR research,
• BioMS to enable protein-based AB discovery,
• PPS for protein production,
• Structural Proteomics and Cryo-EM/LU to define AIR binding,
• The Lund University Virus Centre to provide functional AIR analysis in pandemic contexts,
• NBIS to enable AIR analysis through bioinformatic, AI and ML capabilities.

Impact: AI3R will enable AIR discovery to promote human health.

Estimated annual total funding (MSEK) needed from SciLifeLab:

3 M SEK for 2 FTE staff to be distributed across different existing national (e.g. NBIS, DDD, BioMS, Structural Proteomics, NGI, Cryo-EM) and local (e.g. U-READ, CTG, LU Virus Centre) infrastructure platforms to provide know-how for studies of AIR in a variety of experimental and analytical situations and to integrate different platforms, capabilities with a focus of AIR studies.

Additional comment:

None

013: Development of analytical methods for non-model organisms

Genomics

Olga Vinnere Pettersson, PhD, Uppsala University
olga.pettersson@scilifelab.uu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Planetary Biology Capability)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Bioinformatics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Planetary Biology
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

PB has conducted its own survey among its target community. Results suggest that the majority of technologies required to satisfy PB community needs are already present in SciLifeLab infrastructure. The main limitation, however, is that most of the applications are tailored to model organisms, or mammals only. The community seeks method/service development mainly from Genomics, Bioinformatics & Spatial Biology platforms.
Several service improvement suggestions have been made by the community.
Below we name a few, in order of significance:
-Genomics
Construction of cheap multiplex shotgun libraries for large-scale population genomics & metagenomics
Expanding capacity for making amplicon-based sequencing libraries for large-scale metabarcoding
Expanding DNA/RNA extraction service from non-models, as well as environmental samples; automatization of this service
Construction of genomics & epigenomics libraries from recalcitrant biological samples
Preserving microbial single-cell service
Increasing knowledge transfer with NGI regarding method development
-Bioinformatics
Development of new tools & pipelines for analysis of population-, metagenomic & transcriptomic sequencing data of non-models
Service & support in data preparation for, and submission to data repositories
Genome browser production for non-models
-Spatial Biology
Enabling application of spatial transcriptomics and proteomics to non-mammalian samples
-Metabolomics
Develop/extend reference libraries

Estimated annual total funding (MSEK) needed from SciLifeLab:

The PB recommendation is to focus on service/technological capability development: not to acquire new instrumentation, but to increase the number of FTEs at the existing facilities. Expansion of the current services to non-models will enable researchers to conduct high-impact research, but it requires hands-on development. The existing technological strength combined with strategic investment in human resources to conduct non-model technology R&D;, will allow SciLifeLab to pioneer method development in several areas. Users demand training from the technology platforms, but are also happy to share their know-hows with the infrastructure.

We suggest additional investigation into the necessary number of FTEs per each of aforementioned technology platforms to meet the PB community needs.

Additional comment:

This summary is based on discussion outcomes during the PB kick-off meeting, its follow-up, SciLifeLab day in Göteborg, as well as the PB-initiated survey of current SciLifeLab technologies and services circulated amongst Swedish researchers (including DDLS fellows).

Collection of survey responses is still ongoing and PB will prepare a report to the Management Board upon completion in this fall.

014: LU-Fold

Genomics

Lars-Anders Carlson, Dr., Umeå University
lars-anders.carlson@umu.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (My reasearch group)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, LU-fold at Lund University

Brief description of the technology:

My group has the need to do large-scale structure predictions, in particular to use the so-called alphafold-pulldown methodology to identify interactions between biochemically intractable viral proteins and host proteins. We have discussed a collaboration with Gemmar Atkinson at Lund, and my udnerstanding is that her group is at the forefront of adapting this methods to larger scale (entire proteomes or subsets of proteomes). It is my understanding that Dr. Atkinson currently has funding from Lund mainly to provide this service to local research groups. It would be of massive advantage to Sweden as whole to make this service available to the entire life science community.

Estimated annual total funding (MSEK) needed from SciLifeLab:

don't know

Additional comment:

None

015: NGI OpenLab

Genomics

Tuuli Lappalainen, Professor, Director, KTH, Royal Institute of Technology
tuuli.lappalainen@scilifelab.se

Representing:

Infrastructure (NGI, Genomics Platform)

The technology would fit in the SciLifeLab Platform(s):

Genomics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

NGI OpenLab would be a new accessible genomics lab space and service at Solna and BMC Uppsala for collaborative work with NGI's users and for training and teaching. With a space equipped with basic genomics equipment and supervised by NGI's genomics experts, this service would allow users to perform quality control, to prepare samples for genomics assays and test new methods independently or with guidance from NGI's experts. NGI OpenLab would bridge an increasing gap between researcher needs and current NGI service offerings, as novel applications increasingly emerge from diverse methods for sample preparation, prior to high-throughput sequencing.

Researchers that would particularly benefit from NGI OpenLab are those working on emerging methods, highly specialized ad hoc protocols, and labs that have limited wetlab facilities of their own. Metagenomics, microbiome analysis, biodiversity, functional genomics and single cell assays are examples of areas where users would greatly benefit from accessible facilities and expert guidance to pursue assays that may be too niche for NGI to set up as standardized services.

Importantly, NGI OpenLab would also allow NGI to host courses for hands-on training in genomics, which is currently limited by restricted access and space in the ISO17025 accredited facilities needed for high-throughput data production. This training would educate and empower the research community to pursue cutting-edge genomics methods and applications.

Estimated annual total funding (MSEK) needed from SciLifeLab:

We request 5 MSEK/year for running NGI OpenLab in Solna and BMC in Uppsala. The costs consist of the following: 1) 2.5 MSEK for 1 experienced research engineer per site to coordinate the space and guide the users, 2) 0.75 MSEK for 50 m2 of lab space at each site, 3) 1.75 MSEK for basic consumables, service contracts, etc. The users would need to cover expensive, specialized reagents.

Furthermore, we estimate that an initial investment of 2 MSEK is needed for basic equipment, such as pipettes, PCR machines, centrifuges, and nucleic acid and library QC equipment. This could be funded also via the SciLifeLab Expensive equipment call. We plan to initially equip OpenLab with a benchtop sequencer.

Additional comment:

We propose to initially set up NGI OpenLab in Solna and BMC. In the future, the concept could be expanded to national SciLifeLab sites, potentially in collaboration with the Clinical Genomics Platform and SciLifeLab Capabilities. We envision a powerful combination of local genomics expertise and facilities for sample preparation - sometimes with consultation with experts elsewhere in the country - and subsequent shipping to NGI for analysis that requires expensive large-scale instrumentation.

016: Seahorse Agilent XF (24 or 96 well setup suitable for mitochondria or spheroid analysis)

Genomics

Wojciech Michno, Assistant Professor, Uppsala University
wojciech.michno@scilifelab.uu.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Molecular Geriatrics, Rudbeck laboratory)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Spatial Biology
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Precision Medicine

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Such instrumentation is an indispensable tool in metabolic research.
This platform is robust and highplex allowing for screening and pathway studies.

Estimated annual total funding (MSEK) needed from SciLifeLab:

3 millon

Additional comment:

None

017: Targeted imaging and genomics of the majority of life

Genomics

Anna Rosling, Lektor, Uppsala University
Anna.Rosling@ebc.uu.se

Representing:

A group of researchers (Competence Center for Hidden Biodiversity)

The technology would fit in the SciLifeLab Platform(s):

Genomics

The suggested technology would contribute to following capabilities:

Planetary Biology

Is the technology currently available as local infrastructure service in Sweden?

Yes, Partially at our competence center, https://www.ieg.uu.se/research/competence-center-for-hidden-biodiversity/

Brief description of the technology:

Over the last decade, environmental DNA (eDNA) studies have revealed a tremendous diversity of hitherto undescribed microbial eukaryotes, including kingdom-level lineages of algae, protists and fungi that vastly surpass the diversity of animals and plants. Many lineages include abundant organisms that dominate their ecosystems but remain unknown because traditional methods for culturing and characterization fails to capture them. Large and repeat rich genomes are common, preventing genomic characterization using metagenomics.

SciLifeLab has currently no national facility geared toward the study of these critical uncultured microbial eukaryotes. Now is the time to ‘catch the train’ with SciLifeLab’s new focus on Planetary science and the unprecedented biodiversity crisis the world is facing. From the breadth of metabarcoding data available, researchers know the barcode sequence of critical organisms in their samples. Now is the time to take this further and study these organisms. A new facility would work on two fronts: 1) imaging: provide competences on design of FISH probes, protocols for verification of specificity and sample preparation for different methods (e.g. CARD-FISH), enrichment methods for complex samples like soils, water and tissues, and automated imaging at high resolution. 2) Genomics: the facility provides support for capture sequencing from complex samples as well as live probing for downstream single cell sorting and genome sequencing.

Estimated annual total funding (MSEK) needed from SciLifeLab:

One advanced technician at fulltime costs about 1.2 million per year. This person would work together with visiting researchers to set up methods for each particular sample type and organism group.
User fees would cover all consumables and lab space for vising researchers. At the facility samples would be prepared either for sorting at the microbial single cell facility or segueing at NGI. Imaging capacity is already available in our existing competence center but investments in automated image analysis would be needed, approximately 300 000 kr.

Additional comment:

For Swedish researchers in the field of hidden diversity exploration access to SciLifeLab infrastructures are currently severely hampered by sample requirements that do not accommodate “dirty” environmental samples with high diversity of non-model organisms. To push the frontiers in genomics of the entire eukaryotic diversity, SciLifeLab need to work towards making the latest technologies accessible to studies of the complex unknown that is out there running ecosystem processes.

018: Working chain for cancer related questions

Genomics

Mischa Woisetschläger, Dr, Health care, Radiology department Linköping
mischa.woisetschlager@regionostergotland.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Group of diff specialties with cancer research)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Clinical Proteomics and Immunology
Integrated Structural Biology
Bioinformatics

The suggested technology would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

I do not know

Brief description of the technology:

We would love a working chain for the handling of cancerspecific projects with the integration of images, genetic, journal information with regards to big data handling, radiomics and AI.

Estimated annual total funding (MSEK) needed from SciLifeLab:

3 000 000 SEK

Additional comment:

None

019: Environmental Genomics and Epidemiology (EGE)

Anna Székely, docent, Swedish University of Agricultural Sciences
anna.szekely@slu.se

Representing:

A group of researchers, University leadership, Infrastructure (Swedish Environmental Epidemiology Center (SEEC))

The facility would fit in the SciLifeLab Platform(s):

Genomics

Facility location:

SLU, Ultuna

Contact person for the facility:

Anna J. Székely

Contact person email address:

anna.szekely@slu.se

Current number of unique users annually:

1-10, 10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

Development of molecular biology revolutionized a wide range of fields beyond biomedical sciences, enabling genomics-based research and applications, in disciplines such as environmental sciences and monitoring, biotechnology, food safety or public health. However, current molecular techniques and capacities primarily focus on biomedical applications that are not optimized for environmental samples, leaving researchers and stakeholders interested in such samples underserved.
We propose the Environmental Genomics & Epidemiology (EGE) facility as a solution to the insufficiency in infrastructure and services for molecular processing and analyses of environmental and miscellaneous samples. EGE will offer state-of-the-art high throughput processing of typical environmental samples (e.g. water, soil) using standardized methods. The processed samples can then be fed into the existing pipelines of other SciLifeLab platforms (e.g. Genomics, Proteomics, Metabolomics). EGE will also provide customized services for environmental projects with more specialized or challenging needs such as processing of degraded low biomass samples, assays for special targets (e.g. invasive species detection), time sensitive applications (e.g. pathogen profiling) or cell sorting services together with the Microbial Single Cell Genomics Facility.
SLU, as a leading university in sustainable development and natural resources is an ideal host for EGE. SLU not only combines education and cutting-edge research in ecology, agriculture, veterinarian sciences and biotechnology, but also has a unique governmental mandate in environmental monitoring and assessment (EMA) and advising science-based policy. EGE will build on SEEC, which is an SLU-associated capability of the PLP program of SciLifeLab, while incorporating SLU's existing knowledge and capacities in molecular environmental sciences and bioinformatics (SLUBI) and strengthening existing connections to SciLifeLab's Planetary Biology capability.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Estimated annual costs*: 4-5 mo SEK/year
– Permanent personnel including overheads:** 2 mo SEK (2 FTE research assistant, 2 FTE research engineers, 0.5 FTE leadership)
– Infrastructure maintenance and development: 1-1.5 mo SEK
– R&D; tasks: 1-1.5 mo SEK

Estimated income from service fees: 5-50 mo SEK/year
– Large projects: >2 mo SEK/year/project; primarily EMA-related tasks, capacity for 2-5 such

019: Environmental Genomics and Epidemiology (EGE) (cont.)

Anna Székely, docent, Swedish University of Agricultural Sciences
anna.szekely@slu.se

projects/year, likely to necessitate hiring of additional project-dedicated personnel.
Current examples:
o weekly wastewater-based pathogen monitoring for FoHM ≈ 5 mo SEK/year (ongoing)
o DNA-based biomonitoring of freshwater systems for HaV ≈ 15 mo SEK/year (ongoing pilot 4.5 mo SEK/year)
– Medium-small projects: 50 000 – 2 mo SEK/year/project; 5-50 primarily research projects/year

Additional comment:

*Besides exiting capacities of SEEC, EGE would require initial investment in instrumentation. In addition, we propose incorporation of instruments of the Microbial Single Cell Genomics Facility. Suitable localities are readily available at SLU which could be part of co-funding from SLU.
**Processing of environmental samples with limited commercial availability of dedicated applications, and R&D; tasks required to maintain state-of-the-art services necessitate highly trained permanent personal

020: LU-Fold

Gemma Atkinson, Dr, Lund University
gemma.atkinson@med.lu.se

Genomics

***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher, A group of researchers, Infrastructure (LU Fold facility at Lund University, and my group)

The facility would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Cellular and Molecular Imaging
Integrated Structural Biology
Bioinformatics
I do not know

Facility location:

Lund University

Contact person for the facility:

Gemma Atkinson

Contact person email address:

gemma.atkinson@med.lu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

LU-Fold is a new Lund University-based facility for helping researchers predict protein structures of interest using the cutting-edge method AlphaFold2 (Nature Methods method of the year, 2021). LU-Fold specialises in high-throughput prediction of protein complexes to predict novel protein-protein interactions. For example, we can predict pairwise interactions of a protein of interest with all other proteins in a proteome to find new binding partners and molecular binding interfaces.

We run as a service, using national high performance computing infrastructure to make high-throughput structural predictions. Users do not have to have any previous bioinformatics or structural biology experience.

Our services include prediction of:
– pairwise binding interactions of a protein of interest with all other proteins in a proteome
– structures of all proteins in a proteome (for instance from a newly sequenced genome)
– higher order structures of larger complexes
– the effects of mutations and truncations on proteins

We also offer training through workshops, tutorials and online guides to help others make predictions, compare structures, visualise results and make publication-quality figures.

This novel service was urgently needed and is receiving significant interest. The facility officially starts in August 2023, and until then the Atkinson lab has been initiating pilot projects within the scope of local and national collaborations. So far we have been collaborating on projects that e.g. find interactions of virus proteins with the human proteome, predict oligomers of bacterial cell division proteins, discover binding partners of proteins associated with childhood cancer neuroblastoma, and predict interactions of proteins involved in neurological disorders. We have made connections with researchers at MAX IV, and the SciLifeLab Cryo-EM and Structural Proteomics units in Lund, who see ample opportunities for partnership and knowledge sharing.

How is the facility providing infrastructure services today?

As a local core-facility, Currently funded solely by Lund University

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

The major cost is salaries as we do not rely on very expensive local equipment and consumables. Currently we have one engineer serving Lund University alone. To offer the service nationally, we

Gemma Atkinson, Dr, Lund University
gemma.atkinson@med.lu.se

***Please note that this proposal is also found under other platforms*

would need at least one more staff member, plus at least a 20% director position. Overhead, rent and small running costs are additional budget expenses. As a rough estimate, the total cost of a (minimal) national LU-Fold facility would be between 3 and 3.5 million per year.

We predict it would take a SciLifeLab investment of at least around 1.5-2 million per year to make LU-Fold nationally available. This assumes LU-Fold funding from Lund University remains the same at around 1 million per year, plus some cost recovery with user fees (potentially around 600 000 per year).

Additional comment:

SciLifeLab support of LU-Fold would strategically benefit both entities. For LU-Fold, the additional investment would aid sustainability and ability to help more researchers. For SciLifeLab, with LU-Fold's connection to structural biology, proteomics, genetics, and bioinformatics, there is significant added value, with many opportunities for synergies and integration with other existing SciLifeLab platforms. Education and training activities could be integrated with the SciLifeLab Training hub.

021: Lund University Bioimaging Centre

Genomics

Sebastian Wasserstrom, PhD, Lund University
sebastian.wasserstrom@med.lu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Lund University Bioimaging Centre)

The facility would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Spatial Biology
Cellular and Molecular Imaging
Integrated Structural Biology

Facility location:

Lund University

Contact person for the facility:

Sebastian Wasserstrom

Contact person email address:

sebastian.wasserstrom@med.lu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

LBIC has strategically invested in light-sheet microscopy and optical clearing since 2019, acquiring two systems and adopting various clearing techniques, including a recent high-throughput commercial clearing system purchase.
Collaborations with other infrastructures and research groups with specialized microscopes further enhance LBIC's value. These include live pathogen and high-throughput imaging platforms. For instance, in partnership with the Centre for Translational Genomics, LBIC is preparing workflows for spatial transcriptomics and single-cell NGS using 10X Genomics Visium and Takara ICELL8 cx Single-Cell System, available from late 2023. LBIC is also collaborating with Lund University's Pontus Nordenfelt group and Cytely AB to implement data-driven microscopy. This innovative concept, developed by the Nordenfelt group, integrates data-independent and data-dependent steps, enhancing live-cell imaging, reducing bias, increasing reproducibility, aligning with the SciLifeLab & Wallenberg Nat. Data-Driven Life Science initiative. In June, LBIC and the Dep. Exp Med Sciences jointly procured a 120kV Transmission Electron Microscope and a 200kV Cryo Electron Microscope. This adds opportunities for ultra-high-resolution microscopy and correlative workflows at the medical faculty and integrates with the CryoScreeNET, facilitating preliminary experiments before imaging at the SciLifeLab Cryo-EM sites in Stockholm and Umeå. LBIC personnel will be trained to operate and support these systems.
Integrating the above described components into SciLifeLab's infrastructure services will expand LBIC's impact to a larger base of national medical researchers and would offer unique large sample light microscopy and data-driven microscopy workflows for researchers in southern Sweden. Leveraging its current position, LBIC is well-equipped to deliver services aligned with multiple SciLifeLab platforms, meeting diverse medical researchers' advanced requirements.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility, LBIC is an imaging resource available to preclinical and clinical research groups at Lund University, Region Skåne as well as external organizations and companies. LBIC hosts a large variety of advanced preclinical and clinical imaging equipment and techniques ranging from micro to macro.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Estimated annual funding needs is 1.5 MSEK to cover two 50% research positions.
Co-funding: LU Medical faculty and private funding and ALF (Region Skåne).
An estimated 25% of running costs will be covered by user fees.

Additional comment:

021: Lund University Bioimaging Centre (cont.)

Genomics

Sebastian Wasserstrom, PhD, Lund University
sebastian.wasserstrom@med.lu.se

***Please note that this proposal is also found under other platforms*

Established in 2008, Lund University Bioimaging Centre (LBIC) primarily specialized in in vivo imaging with a focus on open access and expert staff. Initially consisting of MRI and PET/SPECT platforms, LBIC added electron microscopy in 2010 and light microscopy in 2013. Presently, LBIC provides a broad imaging platform, data analysis, and visualization. Our goal is to integrate our cutting edge light microscopy, correlative and data-driven microscopy services into the SciLifeLab infrastructure.

022: RNA modification MS

Genomics

Carina Sihlbom Wallem, Head of unit, University of Gothenburg
carina.sihlbom@gu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure

The facility would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Chemical Biology and Genome Engineering
Clinical Proteomics and Immunology

Facility location:

University of Gothenburg

Contact person for the facility:

Carina Sihlbom Wallem

Contact person email address:

carina.sihlbom@gu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

Different chemical modifications play distinct regulatory roles in RNA function, eg. methyl6A influences RNA metabolism in stability, splicing, translation, localization and RNA secondary structure. Mass spectrometry (MS) is currently the only technique that can directly and comprehensively characterize and quantify chemical modifications in RNA sequences. Other methods require prior knowledge of the sequence information to target a single specific nucleotide and cannot quantify the modification status in a de novo manner or are dependent on radioactive or other reagents. The majority of RNA MS has previously focused on reducing the RNA to mono-nucleosides and applying workflows analogous to metabolite analysis. These techniques are effective in determining which modifications are present but all critical information about the location and co-occurrence of modifications is lost. Analysis of intact RNA oligonucleotides (5-15 nucleotide fragments) by tandem mass spectrometry (MS/MS) is capable of determining modification sites with single-nucleotide resolution. RNA samples are first digested by selective endoribonucleases and then separated via MS compatible ion-pair liquid chromatography (LC). The current approach of choice has been set up at the Proteomics Core Facility at University of Gothenburg. This LC-MS approach can provide both site, type and quantitative information for the RNA modifications of interest and is to our knowledge not earlier available in Sweden.

How is the facility providing infrastructure services today?

As a local core-facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

MS expert 30% 300 kSEK
Material/ Chemicals 50 kSEK
Service contracts MS instruments 50 kSEK

Co-funding from GU in terms of shared MS instrument, staff and lab space.

Additional comment:

None

Clinical Genomics

Proposals on New Technologies p. 44-49

Proposals on New Infrastructure Units p. 50-56

023: A national Adaptive Immune Receptor Repertoire Resource (AI3R)

Clinical Genomics

Mats Ohlin, Professor, Lund University
mats.ohlin@immun.lth.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Leaders of relevant infrastructure units in Lund)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Integrated Structural Biology
Drug Discovery and Development
Bioinformatics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Context: Studies of adaptive immune receptors (AIR) (antibodies and T cell receptors) by high-end technologies enable understanding of the complexity and functionality of AIR responses for development of therapeutics, diagnostics, and bioanalysis. A diversity of genetic, protein and bioactivity data define AIR. The complexity and nature of AIR puts specific requirements on technologies, bioinformatics, and AI/ML in such studies, e.g. for our preparedness to swiftly respond through AIR solutions to novel pandemics.

Concept: The AI3R cross-platform initiative will use and develop existing competence and integrate infrastructures' capabilities specifically for studies of AIR.

AI3R vision: To be an integrated resources to promote AIR research.
AI3R mission: To enable high quality AIR research by a diversity of teams in Sweden.

AI3R will develop and guide research through integrated competences of existing local and national infrastructures, such as

• U-READ for antibody development / integration with SciLifeLab DDD capabilities,
• CTG/NGI to enable gene-based AIR research,
• BioMS to enable protein-based AB discovery,
• PPS for protein production,
• Structural Proteomics and Cryo-EM/LU to define AIR binding,
• The Lund University Virus Centre to provide functional AIR analysis in pandemic contexts,
• NBIS to enable AIR analysis through bioinformatic, AI and ML capabilities.

Impact: AI3R will enable AIR discovery to promote human health.

Estimated annual total funding (MSEK) needed from SciLifeLab:

3 M SEK for 2 FTE staff to be distributed across different existing national (e.g. NBIS, DDD, BioMS, Structural Proteomics, NGI, Cryo-EM) and local (e.g. U-READ, CTG, LU Virus Centre) infrastructure platforms to provide know-how for studies of AIR in a variety of experimental and analytical situations and to integrate different platforms, capabilities with a focus of AIR studies.

Additional comment:

None

024: LU-Fold

Clinical Genomics

Lars-Anders Carlson, Dr., Umeå University
lars-anders.carlson@umu.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (My reasearch group)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, LU-fold at Lund University

Brief description of the technology:

My group has the need to do large-scale structure predictions, in particular to use the so-called alphafold-pulldown methodology to identify interactions between biochemically intractable viral proteins and host proteins. We have discussed a collaboration with Gemmar Atkinson at Lund, and my udnerstanding is that her group is at the forefront of adapting this methods to larger scale (entire proteomes or subsets of proteomes). It is my understanding that Dr. Atkinson currently has funding from Lund mainly to provide this service to local research groups. It would be of massive advantage to Sweden as whole to make this service available to the entire life science community.

Estimated annual total funding (MSEK) needed from SciLifeLab:

don't know

Additional comment:

None

025: Seahorse Agilent XF (24 or 96 well setup suitable for mitochondria or spheroid analysis)

Clinical Genomics

Wojciech Michno, Assistant Professor, Uppsala University
wojciech.michno@scilifelab.uu.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Molecular Geriatrics, Rudbeck laboratory)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Spatial Biology
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Precision Medicine

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Such instrumentation is an indispensable tool in metabolic research.
This platform is robust and highplex allowing for screening and pathway studies.

Estimated annual total funding (MSEK) needed from SciLifeLab:

3 millon

Additional comment:

None

026: Spatial transcriptomics based on NanoString technology

Marcela Davila, Assoc. Prof., University of Gothenburg
marcela.davila@gu.se

Representing:

Infrastructure (Core Facilities via Clinical Genomics Gothenburg)

The technology would fit in the SciLifeLab Platform(s):

Clinical Genomics

The suggested technology would contribute to following capabilities:

Precision Medicine

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

The NanoString technology is based on a high-throughput, multiplex, fluorescence-based digital hybridization method where labelled barcodes are directly counted. The technology can be used with RNA, miRNA, and DNA analytes, thus several analyses including gene expression can be assessed.
One of the advantages, over NGS as well as current pathology imaging methodology, is the technical simplicity of the assay with minimum hands-on time (~15 mins). Automation regarding results will also save valuable time when writing clinical reports. Moreover, several molecular diagnostic tests are already available for breast cancer profiling, lung cancer gene fusions, leukemia alterations, among others. This technology will strengthen the healthcare sector by speeding up their response time and making molecular diagnostics more available to patients for better and more personalized and targeted health care.
There are some analytical systems already set up and being provided as service in northern Sweden (e.g. KIGene Core Facility and Clinical Genomics Uppsala); however, it is not yet available at other relevant sites, such as in Gothenburg. Currently, there are local efforts to set this technology (see under Additional comments) and we are initiating a dialogue where Clinical Genomics Gothenburg, will contribute to the setup of the required analytical infrastructure to provide this service to the research community and to integrate it as routine analysis in the healthcare system.

Estimated annual total funding (MSEK) needed from SciLifeLab:

The funding for the first year focuses on implementation, while the funding in years 2 and 3 focus on maintenance and running costs. We foresee that after this period most of the costs will be covered by user fees.

Year 1: 3.5 MSEK
nCounter system 3.5 MSEK
Personnel 1.5 MSEK
Analytical resources 0.5MSEK

Year 2-3: 1.5 MSEK
Personnel 1 MSEK
Other costs 0.5 MSEK

Additional comment:

The purchase of a CosMx Spatial Molecular Imager from NanoString is led by Prof. Henrik Hagberg, Prof. Anders Ståhlberg and Jörg Hanrieder. These research groups have long track records in method development for molecular diagnostics, where old inefficient technologies can be replaced for a more personalized and cost-efficient patient care. The overall project is a collaborative effort between Core Facilities (BDC-CGG and Biobank CF-Biobank Väst) and researchers at the University of Gothenburg.

027: Tailored services for precision medicine to bridge the gap between bedside and bench

Clinical Genomics

Kaska Koltowska, Associate Professor, Uppsala University
kaska.koltowska@igp.uu.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (I represent 20 research groups across Sweden)

The technology would fit in the SciLifeLab Platform(s):

Clinical Genomics
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, DanioReadout at Uppsala University has these services

Brief description of the technology:

DanioReadout is a ground-breaking service platform based at Uppsala University with a visionary goal to revolutionise precision medicine and bridge the gap in healthcare treatment development. DanioReadout is dedicated to developing unique, customer-tailored services to enable rapid and accurate disease modelling and therapy development.

The key to success lies in its utilisation of zebrafish as a versatile and cost-effective model system, with AI operated image analysis, high-through disease modelling, and drug screening. Unlike traditional murine studies, zebrafish offers a range of advantages, making it an ideal candidate for drug testing and estimation of systemic and toxicological effects. Compliant with the 3R principles, zebrafish embryos are not considered research animals reducing the use of higher-order animals in research.

The future success of DanioReadout is strongly routed in the impressive track record. So far over 50 Swedish and international research groups have used the platform's advanced services, resulting in 40 completed projects.

As we embark on the journey towards precision medicine, data driven science for innovative treatment solutions, DanioReadout stands as a guiding light of assurance. By unlocking the functional understanding of genetic discoveries at an unprecedented scale and cost-efficiency, this service platform embraces the future of healthcare and beckons a new era of transformative breakthroughs for patients and researchers alike.

Estimated annual total funding (MSEK) needed from SciLifeLab:

The estimated total annual funding required is between 2,5 MSEK to 3MEK depending on the level of income from the user fees (which could come up to 0.5 MSEK at the beginning and scale up over the years). To effectively run this service the team requires a project coordinator (100%), research assistant (100%), research assistant (50%), and image analyst (20%), to salary costs sum up to 1,7MSEK. The direct costs are 0,6MSEK and the local costs and indirect costs to 0,7MSEK.

Additional comment:

Under new organisational management, DanioReadout will be at the Department of Immunology, Genetics and Pathology (Medical Faculty, Uppsala University). The operational director will be Beata Filipek-Gorniok, to ensure the continuity of services and efficient project coordination. Kaska Koltowska will be a Scientific Director working together with the advisory board (Carolina Wählby (IT), Aristidis Moustakas (IMBIM), Joakim Holmdahl (CIV), Staffan Svärd (ICM), Johan Ledin (FOI))

028: Working chain for cancer related questions

Clinical Genomics

Mischa Woisetschläger, Dr, Health care, Radiology department Linköping
mischa.woisetschlager@regionostergotland.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Group of diff specialties with cancer research)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Clinical Proteomics and Immunology
Integrated Structural Biology
Bioinformatics

The suggested technology would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

I do not know

Brief description of the technology:

We would love a working chain for the handling of cancerspecific projects with the integration of images, genetic, journal information with regards to big data handling, radiomics and AI.

Estimated annual total funding (MSEK) needed from SciLifeLab:

3 000 000 SEK

Additional comment:

None

029: DanioReadout

Beata Filipek-Gorniok, PhD, Uppsala University
beata.filipek.gorniok@ebc.uu.se

Clinical Genomics

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (DanioReadout service facility (former GEZ))

The facility would fit in the SciLifeLab Platform(s):

Clinical Genomics
Chemical Biology and Genome Engineering
Drug Discovery and Development

Facility location:

Uppsala University

Contact person for the facility:

Beata Filipek-Gorniok

Contact person email address:

beata.filipek.gorniok@ebc.uu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

https://www.youtube.com/watch?v=6j0fGAiP9ao&t;=10s
DanioReadout (former Genome Engineering Zebrafish, Uppsala University based SciLifeLab National Facility) has, since 2016, served more than 50 Swedish and international research groups. Facility services included advanced services for disease modeling and project management as well as zebrafish husbandry and publication support resulting in more than 40 scientific publications. GEZ and DanioReadout are organizing world standard seminar series, workshops and conferences to educate researchers and students and raising interest and awareness of the zebrafish model's advantages and disadvantages.

How is the facility providing infrastructure services today?

As a local core-facility, Curently, DanioReadout is focusing on the development of the cancer modeling in zebrafish embryo for the Uppsala based research groups.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

The estimated annual funding required for the DanioReadout is between 2,5 MSEK to 3MEK. The potential future user fees are estimated to be around 0.25-0.7MSEK/year.
Currently DanioReadout is composed of 1.15 FTA and the funding structure is based on the user fees. Local Uppsala University SciLifeLab is currently working on establishing DanioRadout as a local facility. Several grant applications involving DanioReadout as an essential collaborator has been submitted.

Additional comment:

None

030: LU-Fold

Gemma Atkinson, Dr, Lund University
gemma.atkinson@med.lu.se

Clinical Genomics

***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher, A group of researchers, Infrastructure (LU Fold facility at Lund University, and my group)

The facility would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Cellular and Molecular Imaging
Integrated Structural Biology
Bioinformatics
I do not know

Facility location:

Lund University

Contact person for the facility:

Gemma Atkinson

Contact person email address:

gemma.atkinson@med.lu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

LU-Fold is a new Lund University-based facility for helping researchers predict protein structures of interest using the cutting-edge method AlphaFold2 (Nature Methods method of the year, 2021). LU-Fold specialises in high-throughput prediction of protein complexes to predict novel protein-protein interactions. For example, we can predict pairwise interactions of a protein of interest with all other proteins in a proteome to find new binding partners and molecular binding interfaces.

We run as a service, using national high performance computing infrastructure to make high-throughput structural predictions. Users do not have to have any previous bioinformatics or structural biology experience.

Our services include prediction of:
– pairwise binding interactions of a protein of interest with all other proteins in a proteome
– structures of all proteins in a proteome (for instance from a newly sequenced genome)
– higher order structures of larger complexes
– the effects of mutations and truncations on proteins

We also offer training through workshops, tutorials and online guides to help others make predictions, compare structures, visualise results and make publication-quality figures.

This novel service was urgently needed and is receiving significant interest. The facility officially starts in August 2023, and until then the Atkinson lab has been initiating pilot projects within the scope of local and national collaborations. So far we have been collaborating on projects that e.g. find interactions of virus proteins with the human proteome, predict oligomers of bacterial cell division proteins, discover binding partners of proteins associated with childhood cancer neuroblastoma, and predict interactions of proteins involved in neurological disorders. We have made connections with researchers at MAX IV, and the SciLifeLab Cryo-EM and Structural Proteomics units in Lund, who see ample opportunities for partnership and knowledge sharing.

How is the facility providing infrastructure services today?

As a local core-facility, Currently funded solely by Lund University

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

The major cost is salaries as we do not rely on very expensive local equipment and consumables. Currently we have one engineer serving Lund University alone. To offer the service nationally, we

Gemma Atkinson, Dr, Lund University
gemma.atkinson@med.lu.se

***Please note that this proposal is also found under other platforms*

would need at least one more staff member, plus at least a 20% director position. Overhead, rent and small running costs are additional budget expenses. As a rough estimate, the total cost of a (minimal) national LU-Fold facility would be between 3 and 3.5 million per year.

We predict it would take a SciLifeLab investment of at least around 1.5-2 million per year to make LU-Fold nationally available. This assumes LU-Fold funding from Lund University remains the same at around 1 million per year, plus some cost recovery with user fees (potentially around 600 000 per year).

Additional comment:

SciLifeLab support of LU-Fold would strategically benefit both entities. For LU-Fold, the additional investment would aid sustainability and ability to help more researchers. For SciLifeLab, with LU-Fold's connection to structural biology, proteomics, genetics, and bioinformatics, there is significant added value, with many opportunities for synergies and integration with other existing SciLifeLab platforms. Education and training activities could be integrated with the SciLifeLab Training hub.

031: Lund University Bioimaging Centre

Sebastian Wasserstrom, PhD, Lund University
sebastian.wasserstrom@med.lu.se

Clinical Genomics

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Lund University Bioimaging Centre)

The facility would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Spatial Biology
Cellular and Molecular Imaging
Integrated Structural Biology

Facility location:

Lund University

Contact person for the facility:

Sebastian Wasserstrom

Contact person email address:

sebastian.wasserstrom@med.lu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

LBIC has strategically invested in light-sheet microscopy and optical clearing since 2019, acquiring two systems and adopting various clearing techniques, including a recent high-throughput commercial clearing system purchase.
Collaborations with other infrastructures and research groups with specialized microscopes further enhance LBIC's value. These include live pathogen and high-throughput imaging platforms. For instance, in partnership with the Centre for Translational Genomics, LBIC is preparing workflows for spatial transcriptomics and single-cell NGS using 10X Genomics Visium and Takara ICELL8 cx Single-Cell System, available from late 2023. LBIC is also collaborating with Lund University's Pontus Nordenfelt group and Cytely AB to implement data-driven microscopy. This innovative concept, developed by the Nordenfelt group, integrates data-independent and data-dependent steps, enhancing live-cell imaging, reducing bias, increasing reproducibility, aligning with the SciLifeLab & Wallenberg Nat. Data-Driven Life Science initiative. In June, LBIC and the Dep. Exp Med Sciences jointly procured a 120kV Transmission Electron Microscope and a 200kV Cryo Electron Microscope. This adds opportunities for ultra-high-resolution microscopy and correlative workflows at the medical faculty and integrates with the CryoScreeNET, facilitating preliminary experiments before imaging at the SciLifeLab Cryo-EM sites in Stockholm and Umeå. LBIC personnel will be trained to operate and support these systems.
Integrating the above described components into SciLifeLab's infrastructure services will expand LBIC's impact to a larger base of national medical researchers and would offer unique large sample light microscopy and data-driven microscopy workflows for researchers in southern Sweden. Leveraging its current position, LBIC is well-equipped to deliver services aligned with multiple SciLifeLab platforms, meeting diverse medical researchers' advanced requirements.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility, LBIC is an imaging resource available to preclinical and clinical research groups at Lund University, Region Skåne as well as external organizations and companies. LBIC hosts a large variety of advanced preclinical and clinical imaging equipment and techniques ranging from micro to macro.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Estimated annual funding needs is 1.5 MSEK to cover two 50% research positions.
Co-funding: LU Medical faculty and private funding and ALF (Region Skåne).
An estimated 25% of running costs will be covered by user fees.

Additional comment:

031: Lund University Bioimaging Centre (cont.)

Clinical Genomics

Sebastian Wasserstrom, PhD, Lund University
sebastian.wasserstrom@med.lu.se

***Please note that this proposal is also found under other platforms*

Established in 2008, Lund University Bioimaging Centre (LBIC) primarily specialized in in vivo imaging with a focus on open access and expert staff. Initially consisting of MRI and PET/SPECT platforms, LBIC added electron microscopy in 2010 and light microscopy in 2013. Presently, LBIC provides a broad imaging platform, data analysis, and visualization. Our goal is to integrate our cutting edge light microscopy, correlative and data-driven microscopy services into the SciLifeLab infrastructure.

032: RNA modification MS

Carina Sihlbom Wallem, Head of unit, University of Gothenburg
carina.sihlbom@gu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure

The facility would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Chemical Biology and Genome Engineering
Clinical Proteomics and Immunology

Facility location:

University of Gothenburg

Contact person for the facility:

Carina Sihlbom Wallem

Contact person email address:

carina.sihlbom@gu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

Different chemical modifications play distinct regulatory roles in RNA function, eg. methyl6A influences RNA metabolism in stability, splicing, translation, localization and RNA secondary structure. Mass spectrometry (MS) is currently the only technique that can directly and comprehensively characterize and quantify chemical modifications in RNA sequences. Other methods require prior knowledge of the sequence information to target a single specific nucleotide and cannot quantify the modification status in a de novo manner or are dependent on radioactive or other reagents. The majority of RNA MS has previously focused on reducing the RNA to mono-nucleosides and applying workflows analogous to metabolite analysis. These techniques are effective in determining which modifications are present but all critical information about the location and co-occurrence of modifications is lost. Analysis of intact RNA oligonucleotides (5-15 nucleotide fragments) by tandem mass spectrometry (MS/MS) is capable of determining modification sites with single-nucleotide resolution. RNA samples are first digested by selective endoribonucleases and then separated via MS compatible ion-pair liquid chromatography (LC). The current approach of choice has been set up at the Proteomics Core Facility at University of Gothenburg. This LC-MS approach can provide both site, type and quantitative information for the RNA modifications of interest and is to our knowledge not earlier available in Sweden.

How is the facility providing infrastructure services today?

As a local core-facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

MS expert 30% 300 kSEK
Material/ Chemicals 50 kSEK
Service contracts MS instruments 50 kSEK

Co-funding from GU in terms of shared MS instrument, staff and lab space.

Additional comment:

None

033: Translational Genomics Platform

Clinical Genomics

Anders Ståhlberg, Professor, University, Health care, Institute of Biomedicine / WCMTM
anders.stahlberg@gu.se

Representing:

A group of researchers, Infrastructure

The facility would fit in the SciLifeLab Platform(s):

Clinical Genomics

Facility location:

Sahlgrenska University Hospital

Contact person for the facility:

Anders Ståhlberg

Contact person email address:

anders.stahlberg@gu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Precision Medicine

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

This platform is an infrastructure initiative to bring innovations within nucleic acid analysis into healthcare supported by Wallenberg Centre for Molecular and Translational Medicine since 2017. Ultrasensitive sequencing techniques can accurately detect individual disease-associated molecules in liquid biopsies sampled from different body fluids. In cancer, analysis of tumor-derived molecules in blood provides detailed diagnostic and prognostic information. The platform aims include:

-To develop ultrasensitive molecular techniques that enable the analysis of individual nucleic acid molecules with nucleotide resolution and their modifications.
- To demonstrate the clinical utility of analyzing circulating tumor-derived nucleic acids in liquid biopsies.
- To develop and validate liquid biopsy workflows, from sampling to data analysis.
- To facilitate and support clinical studies at all stages using liquid biopsy analysis.

Current technologies lack sensitivity to reliably detect rare variant alleles or are limited to interrogate few pre-defined variants. To overcome these challenges we developed SiMSen-Seq. This technique has a straightforward workflow that allows flexible targeting of multiple sequences and may be applied on minute quantities of DNA . SiMSen-Seq enables the detection and quantification of individual DNA molecules with single nucleotide resolution. It can be applied to essential all clinical sample types, including body fluids. Data analysis is standardized and can be performed with freely available open source software. The Translational Genomics Platform uses SiMSen-Seq and related technologies to meet the clinical need to diagnose and monitor patients with high sensitivity and specificity. Detection of extremely rare variant alleles within a complex mixture of DNA molecules is also becoming increasingly relevant in many other areas, such as forensics, immunology, pathogen detection, neurological and metabolic diseases.

How is the facility providing infrastructure services today?

As a local core-facility, Coordination, project discusssion, may be partner in alls steps from sampling to data analysis, with focus on pre-anlaytics, analytcs and data analysis

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

The core activities including pre-analytics, analytics and bioinfomratics, focusing on SimSen-Seq, 2 MSEK/year. Parts like bioinformatics is already integrated in Clinical Genomics - Gothenburg. A close synergy with the Wallenberg Centre for Molecular and Translational Medicine effort (that is proposed to continue 2025-2028) that is more focused on technology development in relation to clinical challengers but will provide expertise and that the suggested platform may be continuously developed to meed the need using ultrasensitive DNA sequencing from a clinical perspective.

033: Translational Genomics Platform (cont.)

Anders Ståhlberg, Professor, University, Health care, Institute of Biomedicine / WCMTM
anders.stahlberg@gu.se

Additional comment:

None

Clinical Proteomics and Immunology

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Proposals on New Infrastructure Units p. 66-73

034: Carterra LSA

Ronald Sjöberg, researcher, KTH, Royal Institute of Technology
ronald.sjoberg@scilifelab.se

Representing:

Infrastructure

The technology would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

The Carterra LSA is a real-time label-free biosensor that is purpose-built to simultaneously characterize up to 384 kinetic interactions, with up to 1152 ligands being screened in a single automated run. It is based on surface plasmon resonance (SPR) which have been coupled with a microarray format enabling a much higher throughput then traditional SPR-applications. A patented flow printing technology using a network of microchannels enable flow-based arraying of proteins on sensor surfaces. The micro-channels cycle ligand solutions over a defined surface area, maintaining sensitive proteins in a liquid environment throughout the immobilization step and producing highly defined active spots with coverage that approaches saturation. The platform is well positioned to become a new gold standard for drug discovery and antibody therapeutics research and there is currently no other instrument that offer the same combination of capabilities for high throughput characterization of affinity reagents. It is currently not available as a nation-wide service in Sweden. These high-throughput capabilities can be used for infectious disease research objectives even during rapidly evolving situations such as the COVID-19 pandemic. The patented microfluidics enable it to characterize epitope and affinity using sample quantities below other technologies and the speed in conjunction with its high resolution enables rapid decisions on thousands of antibody candidates during viral pandemics.

Estimated annual total funding (MSEK) needed from SciLifeLab:

The price of the most advanced version of the instrument is approximately 7,55M SEK and the service agreement is 0,69M SEK (first year free) so with a five year depreciation plus service agreements the annual cost would be approximately 2M SEK per year for the first five years. The slightly simpler version has a list price of 6,39M SEK and a service cost of 0,57M SEK and would then cost approximately 1,7M SEK Euros per year for the first five years.

Additional comment:

This is exactly the type of instrument that is supposed to be incorporated into the scilifelab infrastructure. It is expensive and due to its high throughput nature a instrument that might not be often used by a single user, and therefore be an instrument that is deemed too expensive to procure for a single user. It would therefore make sense to enable access to such an instrument to a larger user-base by offering it as an available service under the umbrella of the scilifelab infrasturcture.

035: Computational Analytics Support Platform (CASP) – data analytics service for life science researchers

Clinical Proteomics and Immunology

Hans Stenlund, Acting Head of Unit (PhD), Umeå University
hans.stenlund01@umu.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers, Infrastructure (Swedish Metabolomics Centre (SMC))

The technology would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology
Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Drug Discovery and Development
Bioinformatics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, Computational Analytics Support Platform (CASP), Umeå University

Brief description of the technology:

The ability to analyse and draw valid conclusions from complex data sets, generated by high-throughput technologies, has become a bottleneck for many life science researchers. The shortage of skills required to analyse this flood of data has been recognised on both a national and local level.

To help bridge this gap locally, CASP was launched in 2021 at Umeå University, to primarily support but also train life scientists in the analysis of experimental data. CASP has supported a constant flow of researchers, both locally and nationally, from primarily academic, but also industrial settings.

CASP provides a unique set of tools primarily within multivariate data analysis, but also as relevant, AI/deep learning, pathway analysis, univariate statistics and statistical experimental design. These methods are applied to data from multiple technologies (e.g. metabolomics, proteomics, spectroscopy, imaging), contributing to CASP's diverse customer base from areas spanning disease diagnostics, infection biology, agriculture and environmental toxicology.

CASP also acts as a valuable extended support to the Swedish Metabolomics Centre (SMC), supporting users with the analysis and biological interpretation of data, both vital stages where users often require support and was previously difficult to find. CASP also supports the Vibrational Spectroscopy Core Facility and hopes to extend this to other SciLifeLab units i.e. Exposomics who have shown an interest in their service.

Estimated annual total funding (MSEK) needed from SciLifeLab:

CASP would require annual funding of 1 MSEK from SciLifeLab, to cover the salary costs of one member of staff dedicated to service.

Co-funding plans:
Support from Umeå University (including the Chemical Biological Centre):
2023-2024 – received 1.8 MSEK after being recognised as an infrastructure with potential to become of national interest
2025+ (estimate ~500 KSEK/year)

Future applications:
VR for research infrastructures of national interest (6 years funding (50% of total budget))
KAW – Proof of Concept Grant Program (2 years, 1-4 MSEK)

Income from user fees (estimate ~1 MSEK/year)
At present, user fees account for more than 50% of CASP's total revenue presenting CASP as a cost-efficient platform
Income from collaboration partners (estimate ~400 KSEK)

Additional comment:

Interdisciplinary expertise, domain expertise in both technology and life sciences, adds to the uniqueness of CASP, allowing support that goes

035: Computational Analytics Support Platform (CASP) – data analytics service for life science researchers (cont.)

Hans Stenlund, Acting Head of Unit (PhD), Umeå University
hans.stenlund01@umu.se

***Please note that this proposal is also found under other platforms*

beyond data analysis into the biological understanding of data. Their focus is on the analysis of biology readouts – phenotypic/non genomic data, making CASP complementary to bioinformatics support available at NBIS and the UPSC Bioinformatics Facility, who CASP hope to work alongside and together provide a strong support to the life science community.

036: Isolation and Characterization of Extracellular Vesicles

Clinical Proteomics and Immunology

Maria Smedh, Site Coordinator, University of Gothenburg
maria.smedh@gu.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers, Infrastructure (SciLifeLab Gothenburg & the local Core Facilities)

The technology would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology
Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Extracellular vesicles (EVs) are small nano-sized vesicles released by all cells. EVs have been shown to play a major role in both health and disease such as homeostasis, cancer, inflammation, and neurodegenerative diseases. Importantly, in recent years their value to be used as therapeutics, biomarkers and vaccine has been highlighted and they have been extensively used in clinical trials. Publications have grown exponentially during the last years (over 6000 articles published during 2022) and there is now an increasing, unmet need from Swedish researchers to receive infrastructural support with high-quality isolation and characterization of EVs. Due to their nano-size, instruments built for cell analysis cannot be used and advanced instrumentation is needed for both isolation and characterisation of EVs. These instruments are usually expensive and requires specific competence. Here we present a close collaboration between the world leading research group within the EV field, led by Prof. Jan Lötvall, and the Core Facilities in Gothenburg including the SciLifeLab units Proteomics Core Facility and Centre for Cellular Imaging. Our aim is to provide the Swedish research community with the opportunity to isolate EVs followed by characterization with electron microscopy and/or ultrasensitive MS-based protein and RNA profiling as new world-leading capabilities within the SciLifeLab portfolio.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Personell: (2 x 40%) 850 tSEK
Premises: 70 tSEK (4500 SEK/ M2/Yr)
Instrument cost incl service: 400 tSEK
Running cost: 80 tSEK

Total cost: 1400 tSEK/ Yr

User fees: 400 tSEK
Co-finans: 250 tSEK

Applied funding SciLifeLab 750 tSEK/yr

Additional comment:

This service is decided to be implemented within the local Core Facilities infrastructure. It will be set up during the autumn and be operational at the end of the year.

037: Mass photometry

Guillaume Gaullier, PhD, Uppsala University
guillaume.gaullier@kemi.uu.se

Clinical Proteomics and Immunology
***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher

The technology would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology
Integrated Structural Biology
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

I do not know

Is the technology currently available as local infrastructure service in Sweden?

I do not know

Brief description of the technology:

Mass photometry (MP) is a recently developed biophysical technique, now commercialized by the company Refeyn: https://www.refeyn.com

MP enables label-free, in-solution measurement of the molecular weight of biomolecular complexes from 30 kDa to 5 MDa, quick to perform (one measurement takes a few minutes). As a single-molecule method, it is more versatile than SEC-MALS or DLS: it does not need separation of biomolecules and provides information on all species in solution, allowing to assess purity, heterogeneity, stability and stoichiometry. Most importantly, it has much lower sample requirements, allowing its use for even the samples most difficult to prepare. Its broad applicability makes it useful to all biochemists, in academia and beyond.

Easy access to MP for researchers in Sweden would highly strengthen the Integrated Structural Biology unit.
A common issue in single-particle cryoEM is dissociation of a complex upon vitrification: MP would allow rapid screening of conditions that stabilize a complex, and optimize the use of screening microscopes (a bottleneck in cryoEM).
With recent advances in image analysis, cryoEM can study heterogeneous mixtures, but this remains challenging. Knowing how many species are present and their molecular weights from MP would greatly help such analyses, allowing researchers to address more difficult projects (for instance, purification from native sources instead of in vitro reconstitution from recombinantly produced components).

Estimated annual total funding (MSEK) needed from SciLifeLab:

The price range of one instrument is maybe 1 to 2 MSEK (not sure, impossible to find out without requesting a quote).
Ideally, there should be 3 or 4 instruments in infrastructure units, distributed across Sweden (Umeå, Uppsala, Stockholm, Gothenburg, Lund, for example).
This technology is very easy to use, so it would require less than a full-time person per instrument to train users, who could then measure in autonomy.

Additional comment:

None

038: Working chain for cancer related questions

Mischa Woisetschläger, Dr, Health care, Radiology department Linköping
mischa.woisetschlager@regionostergotland.se

Clinical Proteomics and Immunology
***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Group of diff specialties with cancer research)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Clinical Proteomics and Immunology
Integrated Structural Biology
Bioinformatics

The suggested technology would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

I do not know

Brief description of the technology:

We would love a working chain for the handling of cancerspecific projects with the integration of images, genetic, journal information with regards to big data handling, radiomics and AI.

Estimated annual total funding (MSEK) needed from SciLifeLab:

3 000 000 SEK

Additional comment:

None

039: Biobank Core Facility

Åsa Torinsson Naluai, Assoc. Professor, University of Gothenburg
asa.torinsson.naluai@gu.se

Clinical Proteomics and Immunology

Representing:

Infrastructure

The facility would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology

Facility location:

University of Gothenburg

Contact person for the facility:

Åsa Torinsson Naluai

Contact person email address:

asa@clingen.gu.se

Current number of unique users annually:

1-10

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

The Cytek Aurora 5 Spectral flow cytometer for clinical research at the University of Gothenburg and at the Sahlgrenska University Hospital has been a successful endeavor by the research group of Dr. Davide Angeletti. This instrument pushes the boundaries of current flow cytometry and is a crucial addition to the equipment available in the region. With 188 fluorescence detectors (PMTs), this instrument has the most of any flow cytometer available today. It enables researchers to perform experiments using more than 40 simultaneous fluorescent probes (colors), limited only by fluorochrome availability. The instrument will be implemented under the Core Facilities open-access advanced research platforms. It is intuitive and user friendly, with unmatched automation, convenience, and reliability. Placement in the Core Facilities and SciLifeLab, would allow unrestricted access to users for this new instrument and its advanced cutting-edge features. It would also provide the presence of trained personnel and the establishment of routine procedures. The latter is of relevance for translational and clinical research where reproducibility and sample quality are essential. This flow cytometer enables deep phenotypic characterization and functional profiling of millions of individual cells and would become an important asset to the research community. The unit would also focus on developing the technology with innovation in experimental methods, sample quality and computational analysis.

How is the facility providing infrastructure services today?

As a local core-facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Personell: (2 x 40%) 850 tSEK
Premises: 70 tSEK (4500 SEK/ M2/Yr)
Instrument service: 100 tSEK
Running cost: 80 tSEK

Total cost: 1100 tSEK/ Yr

User fees: 400 tSEK
Co-finans: 200 tSEK

Applied funding SciLifeLab 500 tSEK/yr

Additional comment:

None

040: Clinical MS facility

Johan Malmström, Professor, Lund University
johan.malmstrom@med.lu.se

Representing:

Infrastructure (BioMS - biological mass spectrometry)

The facility would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology

Facility location:

Karolinska Institute, University of Gothenburg, Lund University

Contact person for the facility:

Johan Malmström

Contact person email address:

johan.malmstrom@med.lu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

Precision medicine forms a paradigm shift in research with profound impact on health economy and democratization of healthcare by introducing measurable biomarkers as clinical decision support. SciLifeLab has successfully developed clinical genomics for national research and many single proteins are used as clinical markers. However, systems level proteome analysis and disease associated protein variants is a large unused information-rich level of clinical biomarkers. SciLifeLab has today a cutting-edge national infrastructure for mass spectrometry (MS)-based proteomics. Improved chromatography and especially MS with high throughput analysis, new sensitive ion mobility TOF instruments (on market 2021) and Orbitrap Astral MS (2023) have opened entirely new opportunities to develop MS-analysis for clinical research. MS-analysis offers proteome wide analysis or rapid development of assays for protein variants and post-translationally modified proteins, not possible to scale up on any other analytical platform. A world unique opportunity to develop leading cutting edge clinical MS facility is opened due to SRC (VR) funding of instrumentation for a clinical proteomics platform to BioMS and inclusion of all three BioMS sites to SciLifeLab. Dedicated development on standardization, methods on prospective analysis and related knowledge to define clinically meaningful biomarker readouts are needed. Here we propose the SciLifeLab clinical MS facility, distributed in Lund, Gothenburg and Stockholm to lead the clinical proteomics research and implementation. This unit brings new unique functions and generate data for SciLifeLab's and the Data Driven Life Science (DDLS) programs on precision medicine. We expect rapid build-up, leveraging experience from SciLifeLab's clinical genomics and collaborate with other Swedish and international key players in the area, such as Genome Medicine Sweden, Testbed Sweden, Swedish Comprehensive Cancer Center network, Cancer Core Europe.

How is the facility providing infrastructure services today?

As a national facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

6 MSEK/year (2MSEK per site and year).

Funding will be used mainly to recruit and retain technology experts to develop world leading clinical proteomics services.

Additional comment:

Initial management
Head Johan Malmström (LU)
Managers Carina Sihlbom Wallem (GU), Maria Pernemalm (KI)
DDLS PM connection Janne Lehtiö (KI)

Initial services will be based on ongoing activities:
– Diagnostics support for cardiological diseases (GU)

040: Clinical MS facility (cont.)

Johan Malmström, Professor, Lund University
johan.malmstrom@med.lu.se

– Diagnostics in Alzheimer disease (GU)
– Prognostication in glioma patients (GU)
– National sepsis diagnostics (LU)
– Cancer profiling testbed Sweden trial (KI)

New initiative will be started based on user needs
of clinical proteomics

041: Computational Analytics Support Platform (CASP)

Kate Bennett, Platform Manager (PhD), Umeå University
katie.bennett@umu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Computational Analytics Support Platform (CASP))

The facility would fit in the SciLifeLab Platform(s):

Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Clinical Proteomics and Immunology
Drug Discovery and Development
Bioinformatics

Facility location:

Umeå University

Contact person for the facility:

Dr Kate Bennett

Contact person email address:

katie.bennett@umu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

The Computational Analytics Support Platform (CASP) is a data analytics service at Umeå University that primarily supports, but also trains life scientists in the analysis of experimental data, helping researchers unravel complex chemical and biological systems.

Since the platform began in 2021, CASP has supported researchers locally and nationally from diverse research backgrounds including health and disease, environmental toxicology, pharmaceuticals, agriculture and infection biology. CASP also acts as a valuable support to the Swedish Metabolomics Centre, supporting users with both the analysis and biological interpretation of data.

Their focus is on the analysis of phenotypic/non-genomic data from a wide range of technologies including, but not limited to, downstream omics (metabolomics/proteomics), spectroscopy and imaging. CASP provides researchers with advanced data-driven tools and strategies primarily within multivariate data analysis, but also AI/deep learning, univariate statistics, pathway analysis and statistical experimental design.

The uniqueness of CASP arises from their interdisciplinary nature. Combined, the group have strong expertise in data-driven life science, not only understanding statistics and modelling, but have wide domain knowledge arising from active engagement in numerous projects particularly in the ‘omics’ area and beyond. This allows for a full understanding of the researcher’s needs, not only in terms of the data analysis, but also in how the data was generated and equally important, the interpretation of the biology behind the project. Support can be provided from day one starting with experimental design, quality control of generated data, basic to in-depth data analysis, through to interpretation of results and publishing.

CASP’s mission is to help bridge the existing gap in data-driven life science by continuing to provide a valuable and much needed support to the life science community in Umeå and beyond.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility, Providing services to researchers primarily from Umeå University and other Swedish Universities.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

CASP would require annual funding of 1 MSEK from SciLifeLab, to cover the salary costs of one

Kate Bennett, Platform Manager (PhD), Umeå University
katie.bennett@umu.se

***Please note that this proposal is also found under other platforms*

member of staff dedicated to service.

Co-funding plans:

Support from Umeå University (including the Chemical Biological Centre):
2023-2024 – received 1.8 MSEK after being recognised as an infrastructure with potential to become of national interest
2025+ (estimate ~500 KSEK/year)

Future applications:
VR for research infrastructures of national interest (6 years funding (50% of total budget))
KAW – Proof of Concept Grant Program (2 years, 1-4 MSEK)

Income from user fees (estimate ~1 MSEK/year)
At present, user fees account for more than 50% of CASP's total revenue presenting CASP as a cost-efficient platform
Income from collaboration partners (estimate ~400 KSEK)

Additional comment:

CASP aims to provide researchers with services and expertise complementary to those offered by existing bioinformatics support platforms including the SciLifeLab Platform NBIS. Together, CASP aims to contribute to a stimulating work environment within the DDLS Data area node, which will be hosted at UmU, with CASP fitting perfectly in to three of the strategic DDLS research areas; Epidemiology and Biology of Infection, Cell and Molecular Biology and Precision Medicine and Diagnostics.

042: Mass Spectrometry laboratory at Core Facility

Ana Maria Carrasco del Amor, PhD, Linköping University
ana.carrasco@liu.se

Clinical Proteomics and Immunology
***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure

The facility would fit in the SciLifeLab Platform(s):

Metabolomics
Clinical Proteomics and Immunology

Facility location:

Linköping

Contact person for the facility:

Ana Maria Carrasco Del Amor

Contact person email address:

ana.carrasco@liu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Precision Medicine

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

The Core Facility at Linköping University is a research infrastructure that provide cost-effective access to advanced instrumentation, training, consultation, and qualified specialized services within: Bioinformatics, Flow Cytometry and CyTOF Mass Cytometry, Molecular biology, Microscopy, and Mass Spectrometry. The Mass Spectrometry laboratory provides instrumentation, expertise, and assistance for the analysis of a broad range of compounds and applications. The Core Facility assists users in the discussions with the development of experimental designs, sample preparation, analytical method development and interpretation of results. Despite being a small facility, we have a High Resolution Trapped Ion Mobility timsTOF HT with PASEF® technology. Using PaSER for data processing allows for in-depth, high throughput and sensitive proteomics and phosphoproteomics, covering a broad range of applications from single cell to high throughput routine proteomics. We also have Spectronaut Software package aimed at analyzing data independent acquisition (DIA) proteomics experiments. Large experiments with several conditions and replicates consisting of up to tens of thousands of LC-MS runs can be analyzed. We also have a Q Exactive HF Hybrid Quadrupole-Orbitrap Mass Spectrometer that can be used for analysis of very complex samples with Proteome discoverer 2.5 software, we can achieve the identification and quantification of proteins in complex biological samples for a wide range of proteomics workflows. Last, a UltrafleXtreme MALDI system, this high performance MALDI TOF/TOF Mass Spectrometer is used for a broad variety of applications, among some: classical proteomics, intact proteins analysis, glycoproteomics, lipidomics and polymer analysis. We are going to have in a very near future a Liquid Chromatograph with Tandem Mass Spectometer (UHPLC-MSMS) for quantitative analyzes of drugs, drug metabolites, drugs of abuse and endogenous compounds in metabolomics

How is the facility providing infrastructure services today?

As a local core-facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Annual funding to offer national service.
Direct costs:
Materials 345,600 SEK/year
Indirect costs:
Maintenance 1,000,000 SEK/year
software licenses 300,000 SEK/year
Salaries: 480,000 SEK/year
User fee income: 816,000 SEK/year

Additional comment:

None

043: MS based proteomics facility

Jonas Bergquist, Professor Dr, Uppsala University
jonas.bergquist@kemi.uu.se

Clinical Proteomics and Immunology
***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers

The facility would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology
None of the existing platforms

Facility location:

Uppsala

Contact person for the facility:

Jonas Bergquist

Contact person email address:

jonas.bergquist@kemi.uu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

High resolution based proteomics - a service succesfully provided for more than 10 years now - as a local facility but for a national snd international customer group.

How is the facility providing infrastructure services today?

As a local core-facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

4 MSEK/yr - co-funded by users fees

Additional comment:

None

044: RNA modification MS

Carina Sihlbom Wallem, Head of unit, University of Gothenburg
carina.sihlbom@gu.se

Clinical Proteomics and Immunology
***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure

The facility would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Chemical Biology and Genome Engineering
Clinical Proteomics and Immunology

Facility location:

University of Gothenburg

Contact person for the facility:

Carina Sihlbom Wallem

Contact person email address:

carina.sihlbom@gu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

Different chemical modifications play distinct regulatory roles in RNA function, eg. methyl6A influences RNA metabolism in stability, splicing, translation, localization and RNA secondary structure. Mass spectrometry (MS) is currently the only technique that can directly and comprehensively characterize and quantify chemical modifications in RNA sequences. Other methods require prior knowledge of the sequence information to target a single specific nucleotide and cannot quantify the modification status in a de novo manner or are dependent on radioactive or other reagents. The majority of RNA MS has previously focused on reducing the RNA to mono-nucleosides and applying workflows analogous to metabolite analysis. These techniques are effective in determining which modifications are present but all critical information about the location and co-occurrence of modifications is lost. Analysis of intact RNA oligonucleotides (5-15 nucleotide fragments) by tandem mass spectrometry (MS/MS) is capable of determining modification sites with single-nucleotide resolution. RNA samples are first digested by selective endoribonucleases and then separated via MS compatible ion-pair liquid chromatography (LC). The current approach of choice has been set up at the Proteomics Core Facility at University of Gothenburg. This LC-MS approach can provide both site, type and quantitative information for the RNA modifications of interest and is to our knowledge not earlier available in Sweden.

How is the facility providing infrastructure services today?

As a local core-facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

MS expert 30% 300 kSEK
Material/ Chemicals 50 kSEK
Service contracts MS instruments 50 kSEK

Co-funding from GU in terms of shared MS instrument, staff and lab space.

Additional comment:

None

Metabolomics

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045: Computational Analytics Support Platform (CASP) – data analytics service for life science researchers

Metabolomics

Hans Stenlund, Acting Head of Unit (PhD), Umeå University
hans.stenlund01@umu.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers, Infrastructure (Swedish Metabolomics Centre (SMC))

The technology would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology
Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Drug Discovery and Development
Bioinformatics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, Computational Analytics Support Platform (CASP), Umeå University

Brief description of the technology:

The ability to analyse and draw valid conclusions from complex data sets, generated by high-throughput technologies, has become a bottleneck for many life science researchers. The shortage of skills required to analyse this flood of data has been recognised on both a national and local level.

To help bridge this gap locally, CASP was launched in 2021 at Umeå University, to primarily support but also train life scientists in the analysis of experimental data. CASP has supported a constant flow of researchers, both locally and nationally, from primarily academic, but also industrial settings.

CASP provides a unique set of tools primarily within multivariate data analysis, but also as relevant, AI/deep learning, pathway analysis, univariate statistics and statistical experimental design. These methods are applied to data from multiple technologies (e.g. metabolomics, proteomics, spectroscopy, imaging), contributing to CASP's diverse customer base from areas spanning disease diagnostics, infection biology, agriculture and environmental toxicology.

CASP also acts as a valuable extended support to the Swedish Metabolomics Centre (SMC), supporting users with the analysis and biological interpretation of data, both vital stages where users often require support and was previously difficult to find. CASP also supports the Vibrational Spectroscopy Core Facility and hopes to extend this to other SciLifeLab units i.e. Exposomics who have shown an interest in their service.

Estimated annual total funding (MSEK) needed from SciLifeLab:

CASP would require annual funding of 1 MSEK from SciLifeLab, to cover the salary costs of one member of staff dedicated to service.

Co-funding plans:
Support from Umeå University (including the Chemical Biological Centre):
2023-2024 – received 1.8 MSEK after being recognised as an infrastructure with potential to become of national interest
2025+ (estimate ~500 KSEK/year)

Future applications:
VR for research infrastructures of national interest (6 years funding (50% of total budget))
KAW – Proof of Concept Grant Program (2 years, 1-4 MSEK)

Income from user fees (estimate ~1 MSEK/year)
At present, user fees account for more than 50% of CASP's total revenue presenting CASP as a cost-efficient platform
Income from collaboration partners (estimate ~400 KSEK)

Additional comment:

Interdisciplinary expertise, domain expertise in both technology and life sciences, adds to the uniqueness of CASP, allowing support that goes

045: Computational Analytics Support Platform (CASP) – data analytics service for life science researchers (cont.)

Hans Stenlund, Acting Head of Unit (PhD), Umeå University
hans.stenlund01@umu.se

***Please note that this proposal is also found under other platforms*

beyond data analysis into the biological understanding of data. Their focus is on the analysis of biology readouts – phenotypic/non genomic data, making CASP complementary to bioinformatics support available at NBIS and the UPSC Bioinformatics Facility, who CASP hope to work alongside and together provide a strong support to the life science community.

046: Development of analytical methods for non-model organisms

Metabolomics

Olga Vinnere Pettersson, PhD, Uppsala University
olga.pettersson@scilifelab.uu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Planetary Biology Capability)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Bioinformatics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Planetary Biology
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

PB has conducted its own survey among its target community. Results suggest that the majority of technologies required to satisfy PB community needs are already present in SciLifeLab infrastructure. The main limitation, however, is that most of the applications are tailored to model organisms, or mammals only. The community seeks method/service development mainly from Genomics, Bioinformatics & Spatial Biology platforms.
Several service improvement suggestions have been made by the community.
Below we name a few, in order of significance:
-Genomics
Construction of cheap multiplex shotgun libraries for large-scale population genomics & metagenomics
Expanding capacity for making amplicon-based sequencing libraries for large-scale metabarcoding
Expanding DNA/RNA extraction service from non-models, as well as environmental samples; automatization of this service
Construction of genomics & epigenomics libraries from recalcitrant biological samples
Preserving microbial single-cell service
Increasing knowledge transfer with NGI regarding method development
-Bioinformatics
Development of new tools & pipelines for analysis of population-, metagenomic & transcriptomic sequencing data of non-models
Service & support in data preparation for, and submission to data repositories
Genome browser production for non-models
-Spatial Biology
Enabling application of spatial transcriptomics and proteomics to non-mammalian samples
-Metabolomics
Develop/extend reference libraries

Estimated annual total funding (MSEK) needed from SciLifeLab:

The PB recommendation is to focus on service/technological capability development: not to acquire new instrumentation, but to increase the number of FTEs at the existing facilities. Expansion of the current services to non-models will enable researchers to conduct high-impact research, but it requires hands-on development. The existing technological strength combined with strategic investment in human resources to conduct non-model technology R&D;, will allow SciLifeLab to pioneer method development in several areas. Users demand training from the technology platforms, but are also happy to share their know-hows with the infrastructure.

We suggest additional investigation into the necessary number of FTEs per each of aforementioned technology platforms to meet the PB community needs.

Additional comment:

This summary is based on discussion outcomes during the PB kick-off meeting, its follow-up, SciLifeLab day in Göteborg, as well as the PB-initiated survey of current SciLifeLab technologies and services circulated amongst Swedish researchers (including DDLS fellows).

Collection of survey responses is still ongoing and PB will prepare a report to the Management Board upon completion in this fall.

047: Computational Analytics Support Platform (CASP)

Kate Bennett, Platform Manager (PhD), Umeå University
katie.bennett@umu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Computational Analytics Support Platform (CASP))

The facility would fit in the SciLifeLab Platform(s):

Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Clinical Proteomics and Immunology
Drug Discovery and Development
Bioinformatics

Facility location:

Umeå University

Contact person for the facility:

Dr Kate Bennett

Contact person email address:

katie.bennett@umu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

The Computational Analytics Support Platform (CASP) is a data analytics service at Umeå University that primarily supports, but also trains life scientists in the analysis of experimental data, helping researchers unravel complex chemical and biological systems.

Since the platform began in 2021, CASP has supported researchers locally and nationally from diverse research backgrounds including health and disease, environmental toxicology, pharmaceuticals, agriculture and infection biology. CASP also acts as a valuable support to the Swedish Metabolomics Centre, supporting users with both the analysis and biological interpretation of data.

Their focus is on the analysis of phenotypic/non-genomic data from a wide range of technologies including, but not limited to, downstream omics (metabolomics/proteomics), spectroscopy and imaging. CASP provides researchers with advanced data-driven tools and strategies primarily within multivariate data analysis, but also AI/deep learning, univariate statistics, pathway analysis and statistical experimental design.

The uniqueness of CASP arises from their interdisciplinary nature. Combined, the group have strong expertise in data-driven life science, not only understanding statistics and modelling, but have wide domain knowledge arising from active engagement in numerous projects particularly in the ‘omics’ area and beyond. This allows for a full understanding of the researcher’s needs, not only in terms of the data analysis, but also in how the data was generated and equally important, the interpretation of the biology behind the project. Support can be provided from day one starting with experimental design, quality control of generated data, basic to in-depth data analysis, through to interpretation of results and publishing.

CASP’s mission is to help bridge the existing gap in data-driven life science by continuing to provide a valuable and much needed support to the life science community in Umeå and beyond.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility, Providing services to researchers primarily from Umeå University and other Swedish Universities.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

CASP would require annual funding of 1 MSEK from SciLifeLab, to cover the salary costs of one

Kate Bennett, Platform Manager (PhD), Umeå University
katie.bennett@umu.se

***Please note that this proposal is also found under other platforms*

member of staff dedicated to service.

Co-funding plans:

Support from Umeå University (including the Chemical Biological Centre):
2023-2024 – received 1.8 MSEK after being recognised as an infrastructure with potential to become of national interest
2025+ (estimate ~500 KSEK/year)

Future applications:
VR for research infrastructures of national interest (6 years funding (50% of total budget))
KAW – Proof of Concept Grant Program (2 years, 1-4 MSEK)

Income from user fees (estimate ~1 MSEK/year)
At present, user fees account for more than 50% of CASP's total revenue presenting CASP as a cost-efficient platform
Income from collaboration partners (estimate ~400 KSEK)

Additional comment:

CASP aims to provide researchers with services and expertise complementary to those offered by existing bioinformatics support platforms including the SciLifeLab Platform NBIS. Together, CASP aims to contribute to a stimulating work environment within the DDLS Data area node, which will be hosted at UmU, with CASP fitting perfectly in to three of the strategic DDLS research areas; Epidemiology and Biology of Infection, Cell and Molecular Biology and Precision Medicine and Diagnostics.

048: Mass Spectrometry laboratory at Core Facility

Metabolomics

Ana Maria Carrasco del Amor, PhD, Linköping University
ana.carrasco@liu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure

The facility would fit in the SciLifeLab Platform(s):

Metabolomics
Clinical Proteomics and Immunology

Facility location:

Linköping

Contact person for the facility:

Ana Maria Carrasco Del Amor

Contact person email address:

ana.carrasco@liu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Precision Medicine

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

The Core Facility at Linköping University is a research infrastructure that provide cost-effective access to advanced instrumentation, training, consultation, and qualified specialized services within: Bioinformatics, Flow Cytometry and CyTOF Mass Cytometry, Molecular biology, Microscopy, and Mass Spectrometry. The Mass Spectrometry laboratory provides instrumentation, expertise, and assistance for the analysis of a broad range of compounds and applications. The Core Facility assists users in the discussions with the development of experimental designs, sample preparation, analytical method development and interpretation of results. Despite being a small facility, we have a High Resolution Trapped Ion Mobility timsTOF HT with PASEF® technology. Using PaSER for data processing allows for in-depth, high throughput and sensitive proteomics and phosphoproteomics, covering a broad range of applications from single cell to high throughput routine proteomics. We also have Spectronaut Software package aimed at analyzing data independent acquisition (DIA) proteomics experiments. Large experiments with several conditions and replicates consisting of up to tens of thousands of LC-MS runs can be analyzed. We also have a Q Exactive HF Hybrid Quadrupole-Orbitrap Mass Spectrometer that can be used for analysis of very complex samples with Proteome discoverer 2.5 software, we can achieve the identification and quantification of proteins in complex biological samples for a wide range of proteomics workflows. Last, a UltrafleXtreme MALDI system, this high performance MALDI TOF/TOF Mass Spectrometer is used for a broad variety of applications, among some: classical proteomics, intact proteins analysis, glycoproteomics, lipidomics and polymer analysis. We are going to have in a very near future a Liquid Chromatograph with Tandem Mass Spectometer (UHPLC-MSMS) for quantitative analyzes of drugs, drug metabolites, drugs of abuse and endogenous compounds in metabolomics

How is the facility providing infrastructure services today?

As a local core-facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Annual funding to offer national service.
Direct costs:
Materials 345,600 SEK/year
Indirect costs:
Maintenance 1,000,000 SEK/year
software licenses 300,000 SEK/year
Salaries: 480,000 SEK/year
User fee income: 816,000 SEK/year

Additional comment:

None

049: Targeted Exposomics-TELU

Christian Lindh, Docent, Lund University
christian.lindh@med.lu.se

Representing:

An individual researcher (Div. of Occupational and Environmental Medicine)

The facility would fit in the SciLifeLab Platform(s):

Metabolomics

Facility location:

Lund

Contact person for the facility:

Christian Lindh

Contact person email address:

christian.lindh@med.lu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

None

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

Pollution affects a large number of people in Sweden and beyond. The most recent WHO environmental burden of disease estimations suggest that, annually, 13% of deaths (630 000) in Europe are attributable to environmental stressors. The growing burden of chronic diseases is a challenge for Sweden's healthcare systems and calls for preventive actions.
A key success factor for prevention of diseases linked to environmental stressors is the access to state-of-the-art methods that can measure and monitor the exposure to pollutants and their toxicity, clarifying dose-response relationships and establish causality between environment and disease. At TELU there is a mass spectrometry facility with strong expertise in high throughput analysis of multiple small molecules/metabolites and elements, so called targeted exposomics, ideal for studying pollution and its health consequences. The facility is unique for Sweden and it is recognized as one of the world-leading laboratories in exposure analysis.
TELU is a collaboration between Lund University and Region Skåne and state-of-the-art laboratory is equipped with advanced mass spectrometry instruments. Liquid chromatography-tandem MS instruments; QTRAP 7500, QTRAP 6500+, two Q-TRAP 5500, QTRAP 4500 and a Q-TOF 5600 (Sciex). Several are equipped with 2D LC/LC-MS/MS. Two gas chromatography instruments with both single (GC-MS; Agilent) and tandem MS (GC-MS/MS; Agilent) and for inorganic analysis (multielement analysis) an inductively coupled plasma mass spectrometer available (ICP-MS; Thermo).
Our team has extensive experience in method development and applications using the instruments. We have the flexibility to rapidly introduce new project ideas for our users. Our laboratory is world leading for some of the methodology developed and a goal is to strive for that our methods are applied in real life environmental problems.

How is the facility providing infrastructure services today?

As a national facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Recently the laboratory has had the possibility to test, for a limited time, a new state-of the-art instrument with excellent possibilities to develop analytical methods for difficult biomarkers of toxicity or matrices. An investment in the new instrument is crucial for further development of the infrastructure at an estimated cost of 5.5 million SEK. At 5-year depreciation: 1.1 million/year. To secure long-term planning and management of the infrastructure salary for expert staff and administration: 1 millon SEK/year. Total 2.1 million/year. The running costs are about 7 million SEK/year for operation of existing infrastructure, today about 80% is covered by user fees (salaries, consumables, rent, instrument service).

Additional comment:

Users in Lund: From Region Skåne, Med. Fak, FoS, LTH; Medicon Village. National users:

049: Targeted Exposomics-TELU (cont.)

Christian Lindh, Docent, Lund University
christian.lindh@med.lu.se

National Food Agency, Swedish Environmental Protection Agency, Karolinska Institutet, Universities of Gothenburg, Umeå, Uppsala, Karlstad, Örebro, and Stockholm; International users in Denmark, Norway, Finland, Iceland, The Netherlands, UK, Switzerland, USA, Canada, Costa Rica, Bolivia Chile, Colombia, Nicaragua, El Salvador, Mexico, South Africa, Uganda and, Bangladesh

Spatial Biology

Proposals on New Technologies p. 86-92

Proposals on New Infrastructure Units p. 93-97

050: Computational Analytics Support Platform (CASP) – data analytics service for life science researchers

Hans Stenlund, Acting Head of Unit (PhD), Umeå University
hans.stenlund01@umu.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers, Infrastructure (Swedish Metabolomics Centre (SMC))

The technology would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology
Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Drug Discovery and Development
Bioinformatics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, Computational Analytics Support Platform (CASP), Umeå University

Brief description of the technology:

The ability to analyse and draw valid conclusions from complex data sets, generated by high-throughput technologies, has become a bottleneck for many life science researchers. The shortage of skills required to analyse this flood of data has been recognised on both a national and local level.

To help bridge this gap locally, CASP was launched in 2021 at Umeå University, to primarily support but also train life scientists in the analysis of experimental data. CASP has supported a constant flow of researchers, both locally and nationally, from primarily academic, but also industrial settings.

CASP provides a unique set of tools primarily within multivariate data analysis, but also as relevant, AI/deep learning, pathway analysis, univariate statistics and statistical experimental design. These methods are applied to data from multiple technologies (e.g. metabolomics, proteomics, spectroscopy, imaging), contributing to CASP's diverse customer base from areas spanning disease diagnostics, infection biology, agriculture and environmental toxicology.

CASP also acts as a valuable extended support to the Swedish Metabolomics Centre (SMC), supporting users with the analysis and biological interpretation of data, both vital stages where users often require support and was previously difficult to find. CASP also supports the Vibrational Spectroscopy Core Facility and hopes to extend this to other SciLifeLab units i.e. Exposomics who have shown an interest in their service.

Estimated annual total funding (MSEK) needed from SciLifeLab:

CASP would require annual funding of 1 MSEK from SciLifeLab, to cover the salary costs of one member of staff dedicated to service.

Co-funding plans:
Support from Umeå University (including the Chemical Biological Centre):
2023-2024 – received 1.8 MSEK after being recognised as an infrastructure with potential to become of national interest
2025+ (estimate ~500 KSEK/year)

Future applications:
VR for research infrastructures of national interest (6 years funding (50% of total budget))
KAW – Proof of Concept Grant Program (2 years, 1-4 MSEK)

Income from user fees (estimate ~1 MSEK/year)
At present, user fees account for more than 50% of CASP's total revenue presenting CASP as a cost-efficient platform
Income from collaboration partners (estimate ~400 KSEK)

Additional comment:

Interdisciplinary expertise, domain expertise in both technology and life sciences, adds to the uniqueness of CASP, allowing support that goes

050: Computational Analytics Support Platform (CASP) – data analytics service for life science researchers (cont.)

Hans Stenlund, Acting Head of Unit (PhD), Umeå University
hans.stenlund01@umu.se

***Please note that this proposal is also found under other platforms*

beyond data analysis into the biological understanding of data. Their focus is on the analysis of biology readouts – phenotypic/non genomic data, making CASP complementary to bioinformatics support available at NBIS and the UPSC Bioinformatics Facility, who CASP hope to work alongside and together provide a strong support to the life science community.

051: Development of analytical methods for non-model organisms

Spatial Biology

Olga Vinnere Pettersson, PhD, Uppsala University
olga.pettersson@scilifelab.uu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Planetary Biology Capability)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Bioinformatics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Planetary Biology
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

PB has conducted its own survey among its target community. Results suggest that the majority of technologies required to satisfy PB community needs are already present in SciLifeLab infrastructure. The main limitation, however, is that most of the applications are tailored to model organisms, or mammals only. The community seeks method/service development mainly from Genomics, Bioinformatics & Spatial Biology platforms.
Several service improvement suggestions have been made by the community.
Below we name a few, in order of significance:
-Genomics
Construction of cheap multiplex shotgun libraries for large-scale population genomics & metagenomics
Expanding capacity for making amplicon-based sequencing libraries for large-scale metabarcoding
Expanding DNA/RNA extraction service from non-models, as well as environmental samples; automatization of this service
Construction of genomics & epigenomics libraries from recalcitrant biological samples
Preserving microbial single-cell service
Increasing knowledge transfer with NGI regarding method development
-Bioinformatics
Development of new tools & pipelines for analysis of population-, metagenomic & transcriptomic sequencing data of non-models
Service & support in data preparation for, and submission to data repositories
Genome browser production for non-models
-Spatial Biology
Enabling application of spatial transcriptomics and proteomics to non-mammalian samples
-Metabolomics
Develop/extend reference libraries

Estimated annual total funding (MSEK) needed from SciLifeLab:

The PB recommendation is to focus on service/technological capability development: not to acquire new instrumentation, but to increase the number of FTEs at the existing facilities. Expansion of the current services to non-models will enable researchers to conduct high-impact research, but it requires hands-on development. The existing technological strength combined with strategic investment in human resources to conduct non-model technology R&D;, will allow SciLifeLab to pioneer method development in several areas. Users demand training from the technology platforms, but are also happy to share their know-hows with the infrastructure.

We suggest additional investigation into the necessary number of FTEs per each of aforementioned technology platforms to meet the PB community needs.

Additional comment:

This summary is based on discussion outcomes during the PB kick-off meeting, its follow-up, SciLifeLab day in Göteborg, as well as the PB-initiated survey of current SciLifeLab technologies and services circulated amongst Swedish researchers (including DDLS fellows).

Collection of survey responses is still ongoing and PB will prepare a report to the Management Board upon completion in this fall.

052: Plasma focused ion beam (FIB) scanning electron microscopy (-SEM) and additional volume imaging scanning instrument (e.g micro-CT)

Spatial Biology

Linda Sandblad, Facility Director, Researcher, PI, Umeå University
linda.sandblad@umu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure

The technology would fit in the SciLifeLab Platform(s):

Spatial Biology
Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Planetary Biology
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Focused Ion Beam (FIB) Scanning Electron Microscopy (-SEM) for cellular volume imaging is an emerging methods, high demand from experienced Cryo-EM user groups, molecular and cell biologists in all fields; marine biology, plant science to medicine! Current FIB-SEM instrument (only) one at Umeå University is heavily used for all application, to continue to stay at the forefront of technology development facility and facility users would like to upgrade the Swedish facility with a new Plasma FIB-SEM, operating under ideal cryo-conditions, fast, for cryo-lamella, volume sections from cells and tissue, preparation as main, focus application. And to fulfil further cell biology need, to image larger cellular volumes and cell-cell interactions FIB volume-scope will make the, today slow, FIB volume imaging data collection more accessable, produce larger volumes to study, infection and cel cel communication and will free time for other applications. To the family belongs a third micro-CT instrument (for non-destructuve volume imaging at low resolution, but for samples of 1 cubic mm dimension), which could map the large (compared to EM dimensions) cell and tissue volumes in 3D prior to FIB-SEM milling, which is high resolution of a small volume, around 1 cubic microM. for example to localize/trace a cancer cell in tissue.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Facility staff: 1 M SEK per year, service contracts: 0,5 M SEK per year. Facility premises and lab consumables 0,5 M SEK per year.

Additional comment:

Currently one FIB-SEM is available in Sweden for life science applications.
Investment for new instruments: Plasma FIB: 15-35 M SEK, FIB volume scope: 10M SEK, Micro-CT: 3M SEK (only estimation)

053: Preclinical Multimodal Imaging Systems (PMIS)

Eva Forssell-Aronsson, Professor, University, Health care, Sahlgrenska University Hospital
eva.forssell_aronsson@radfys.gu.se

***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher, A group of researchers, Infrastructure (Sahlgrenska Bioimaging Center, ca 30 groups)

The technology would fit in the SciLifeLab Platform(s):

Spatial Biology
Cellular and Molecular Imaging
Drug Discovery and Development
Bioinformatics

The suggested technology would contribute to following capabilities:

Precision Medicine

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Precision medicine is rapidly evolving and state-of-the-art pre-clinical imaging infrastructures are critical to accelerate translational research and clinical implement. Access to Next-Generation imaging systems that enable simultaneous acquisition from several imaging modalities in longitudinal studies is a current gap in research infrastructure in Sweden.

We have secured funding for a state-of-the-art Pre-clinical Multimodal Imaging System (PMIS) with MRI (magnetic resonance imaging), PET (positron emission tomography), SPECT (single photon emission tomography), and CT (computer tomography), and functional ultrasound (US). The imaging infrastructure will be nationally unique and internationally competitive with MRI, PET, SPECT and CT delivered by the same vendor, enabling simultaneous acquisition from two image modalities and the possibility of subsequent imaging in the same position with the other modalities. This enables true multimodality imaging in order to fully correlate imaging data from all four modalities. Furthermore, the US system is unique in Sweden and has very high sensitivity and spatiotemporal functional resolution with real-time imaging possibility.

The new PMIS at SBIC will attract a broad user base across academia, healthcare and industry nation-wide. Multimodality imaging is crucial for localisation of biomarker expression, in drug development and other types of translational research and helps to bridge the gap from research to clinical routine.

Estimated annual total funding (MSEK) needed from SciLifeLab:

The new cutting-edge imaging technology (PMIS) will be part of SBIC at Experimental Biomedicine (EBM), within Core Facilities (CF) at University of Gothenburg. SBIC will be fully integrated with CFs well established, open access research, with a vast experience in successfully running national research infrastructures. We seek funding of salary costs to enable the platform to operate as a national infrastructure within SciLifeLab. This includes a Platform Scientific Director (20% FTE, 0.38 MSEK), a Platform Manager (50%FTE, 0.59 MSEK) and an administrative support (20%FTE, 0.18 MSEK), at a total cost of ~1.1 MSEK annually.

Additional comment:

The Bioimaging Center at EBM was founded in 2002 as part of the SWEGENE project - a regional infrastructure in the South-West of Sweden, and later continued as a local infrastructure for researchers in academia, healthcare and industry in the Gothenburg area.

The procurement of the new state-of-the-art PMIS described here is in late phase. The eqiopment will be installed in the refurbished imaging facility at EBM during 2024.

054: Seahorse Agilent XF (24 or 96 well setup suitable for mitochondria or spheroid analysis)

Spatial Biology

Wojciech Michno, Assistant Professor, Uppsala University
wojciech.michno@scilifelab.uu.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Molecular Geriatrics, Rudbeck laboratory)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Spatial Biology
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Precision Medicine

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Such instrumentation is an indispensable tool in metabolic research.
This platform is robust and highplex allowing for screening and pathway studies.

Estimated annual total funding (MSEK) needed from SciLifeLab:

3 millon

Additional comment:

None

055: Spatial metaTranscriptomics (SmT)

Spatial Biology

Stefania Giacomello, Group Leader, KTH, Royal Institute of Technology
stefania.giacomello@scilifelab.se

Representing:

An individual researcher, A group of researchers (Giacomello Lab)

The technology would fit in the SciLifeLab Platform(s):

Spatial Biology

The suggested technology would contribute to following capabilities:

Precision Medicine
Planetary Biology
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

SmT is a new technology that our laboratory has recently developed and the relative manuscript has just been accepted in Nature Biotechnology (10 July 2023). SmT is an advancement of Spatial Transcriptomics (ST) and it allows to simultaneously study the microbial (bacterial and fungal) content in a spatial and quantitative manner together with the spatial host gene expression response. The technology is applicable to plant and animal tissues. SmT is an advancement of the 10x Genomics Visium technology, which is already provided by the Spatial Biology facility and, therefore, would be easily implementable.
The usage of SmT enables large scale studies both at the human and plant level.

Estimated annual total funding (MSEK) needed from SciLifeLab:

The implementation of SmT would not require much extra cost considering that the Spatial Biology facility already has the instruments needed to run the Visium assay. Overall, the funding needed would be mostly for personnel to run the assay and some (less than 1 MSEK/year) funding for a few extra reagents.

Additional comment:

None

056: Bio-Imaging SIMS

John Fletcher, Prof., University of Gothenburg
john.fletcher@chem.gu.se

Spatial Biology

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers

The facility would fit in the SciLifeLab Platform(s):

Spatial Biology
Cellular and Molecular Imaging

Facility location:

University of Gothenburg

Contact person for the facility:

john fletcher

Contact person email address:

john.fletcher@chem.gu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

The Bio-Imaging SIMS facility is a local facility housed within the Department of Chemistry and Molecular Biology at the University of Gothenburg (GU). GU is recognised internationally as a leading centre for the development and application of bio-imaging SIMS. The facility houses a 15 Mkr imaging SIMS instrument, sample preparation equipment and data handling computers capable of performing the demanding analysis of the hyperspectral image data that is generated, in a data driven life science approach.
SIMS combines the chemical specificity of mass spectrometry with high spatial resolution provided by the use of focused ion beams to probe the sample. The approach provides molecular information with sub-cellular resolution and is used for mapping small molecules and elements within cells and tissue samples including cryogenically preserved specimen. It is complementary to other imaging modalities in the microscopy and spatial omics arena.
The unique advantages of the facility over existing SciliefeLab facilities are high spatial resolution mass spectrometry images (down to ca. 200 nm), surface sensitive information allowing cell membrane chemistry and interactions to be probed specifically, 3D cellular imaging and the ability to detect both molecular and elemental species.
In recent years research application areas have inculded cancer, cardiovascular, neuroscience and antibiotic resistance research in collaboration with academic and clinical researchers.
Incorporation into SciLifeLab would allow the facility to meet existing and future demand and expand the current capabilities of the facility keeping Swedish research competitive and providing access to novel technology in line with other bio-research leading nations where SIMS is becoming increasingly incorporated into life science infrastructures.
The most logical fit within SciLifeLab would be under the Spatial Biology umbrella although there is also overlap with the Cell and Molecular Imaging platform.

How is the facility providing infrastructure services today?

I do not know

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

1.2 Mkr per year would allow the facility to dedicate technical support for running samples, processing data and performing training for walk up/repeat users.
Servicing and maintenance of the instrumentation requires 0.5 Mkr annually.
Hence, an open service could be offered for ca. 1.7 Mkr. However, this does not take into account the need to upgrade and eventually replace the instrumentation or purchase additional software licenses to support increased user numbers. It also assumes funding of premises costs by the Department of Chemistry and Moleclar Biology in the newly constructed Natrium building in Gothenburg.
Hence, additional applications for instrumentation funding and the setting of non-prohibitive users

John Fletcher, Prof., University of Gothenburg
john.fletcher@chem.gu.se

***Please note that this proposal is also found under other platforms*

fees would be used to create a sustainable platform.

Additional comment:

None

057: Computational Analytics Support Platform (CASP)

Spatial Biology

Kate Bennett, Platform Manager (PhD), Umeå University
katie.bennett@umu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Computational Analytics Support Platform (CASP))

The facility would fit in the SciLifeLab Platform(s):

Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Clinical Proteomics and Immunology
Drug Discovery and Development
Bioinformatics

Facility location:

Umeå University

Contact person for the facility:

Dr Kate Bennett

Contact person email address:

katie.bennett@umu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

The Computational Analytics Support Platform (CASP) is a data analytics service at Umeå University that primarily supports, but also trains life scientists in the analysis of experimental data, helping researchers unravel complex chemical and biological systems.

Since the platform began in 2021, CASP has supported researchers locally and nationally from diverse research backgrounds including health and disease, environmental toxicology, pharmaceuticals, agriculture and infection biology. CASP also acts as a valuable support to the Swedish Metabolomics Centre, supporting users with both the analysis and biological interpretation of data.

Their focus is on the analysis of phenotypic/non-genomic data from a wide range of technologies including, but not limited to, downstream omics (metabolomics/proteomics), spectroscopy and imaging. CASP provides researchers with advanced data-driven tools and strategies primarily within multivariate data analysis, but also AI/deep learning, univariate statistics, pathway analysis and statistical experimental design.

The uniqueness of CASP arises from their interdisciplinary nature. Combined, the group have strong expertise in data-driven life science, not only understanding statistics and modelling, but have wide domain knowledge arising from active engagement in numerous projects particularly in the ‘omics’ area and beyond. This allows for a full understanding of the researcher’s needs, not only in terms of the data analysis, but also in how the data was generated and equally important, the interpretation of the biology behind the project. Support can be provided from day one starting with experimental design, quality control of generated data, basic to in-depth data analysis, through to interpretation of results and publishing.

CASP’s mission is to help bridge the existing gap in data-driven life science by continuing to provide a valuable and much needed support to the life science community in Umeå and beyond.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility, Providing services to researchers primarily from Umeå University and other Swedish Universities.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

CASP would require annual funding of 1 MSEK from SciLifeLab, to cover the salary costs of one

Kate Bennett, Platform Manager (PhD), Umeå University
katie.bennett@umu.se

***Please note that this proposal is also found under other platforms*

member of staff dedicated to service.

Co-funding plans:

Support from Umeå University (including the Chemical Biological Centre):
2023-2024 – received 1.8 MSEK after being recognised as an infrastructure with potential to become of national interest
2025+ (estimate ~500 KSEK/year)

Future applications:
VR for research infrastructures of national interest (6 years funding (50% of total budget))
KAW – Proof of Concept Grant Program (2 years, 1-4 MSEK)

Income from user fees (estimate ~1 MSEK/year)
At present, user fees account for more than 50% of CASP's total revenue presenting CASP as a cost-efficient platform
Income from collaboration partners (estimate ~400 KSEK)

Additional comment:

CASP aims to provide researchers with services and expertise complementary to those offered by existing bioinformatics support platforms including the SciLifeLab Platform NBIS. Together, CASP aims to contribute to a stimulating work environment within the DDLS Data area node, which will be hosted at UmU, with CASP fitting perfectly in to three of the strategic DDLS research areas; Epidemiology and Biology of Infection, Cell and Molecular Biology and Precision Medicine and Diagnostics.

058: Lund University Bioimaging Centre

Spatial Biology

Sebastian Wasserstrom, PhD, Lund University
sebastian.wasserstrom@med.lu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Lund University Bioimaging Centre)

The facility would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Spatial Biology
Cellular and Molecular Imaging
Integrated Structural Biology

Facility location:

Lund University

Contact person for the facility:

Sebastian Wasserstrom

Contact person email address:

sebastian.wasserstrom@med.lu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

LBIC has strategically invested in light-sheet microscopy and optical clearing since 2019, acquiring two systems and adopting various clearing techniques, including a recent high-throughput commercial clearing system purchase.
Collaborations with other infrastructures and research groups with specialized microscopes further enhance LBIC's value. These include live pathogen and high-throughput imaging platforms. For instance, in partnership with the Centre for Translational Genomics, LBIC is preparing workflows for spatial transcriptomics and single-cell NGS using 10X Genomics Visium and Takara ICELL8 cx Single-Cell System, available from late 2023. LBIC is also collaborating with Lund University's Pontus Nordenfelt group and Cytely AB to implement data-driven microscopy. This innovative concept, developed by the Nordenfelt group, integrates data-independent and data-dependent steps, enhancing live-cell imaging, reducing bias, increasing reproducibility, aligning with the SciLifeLab & Wallenberg Nat. Data-Driven Life Science initiative. In June, LBIC and the Dep. Exp Med Sciences jointly procured a 120kV Transmission Electron Microscope and a 200kV Cryo Electron Microscope. This adds opportunities for ultra-high-resolution microscopy and correlative workflows at the medical faculty and integrates with the CryoScreeNET, facilitating preliminary experiments before imaging at the SciLifeLab Cryo-EM sites in Stockholm and Umeå. LBIC personnel will be trained to operate and support these systems.
Integrating the above described components into SciLifeLab's infrastructure services will expand LBIC's impact to a larger base of national medical researchers and would offer unique large sample light microscopy and data-driven microscopy workflows for researchers in southern Sweden. Leveraging its current position, LBIC is well-equipped to deliver services aligned with multiple SciLifeLab platforms, meeting diverse medical researchers' advanced requirements.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility, LBIC is an imaging resource available to preclinical and clinical research groups at Lund University, Region Skåne as well as external organizations and companies. LBIC hosts a large variety of advanced preclinical and clinical imaging equipment and techniques ranging from micro to macro.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Estimated annual funding needs is 1.5 MSEK to cover two 50% research positions.
Co-funding: LU Medical faculty and private funding and ALF (Region Skåne).
An estimated 25% of running costs will be covered by user fees.

Additional comment:

058: Lund University Bioimaging Centre (cont.)

Sebastian Wasserstrom, PhD, Lund University
sebastian.wasserstrom@med.lu.se

***Please note that this proposal is also found under other platforms*

Established in 2008, Lund University Bioimaging Centre (LBIC) primarily specialized in in vivo imaging with a focus on open access and expert staff. Initially consisting of MRI and PET/SPECT platforms, LBIC added electron microscopy in 2010 and light microscopy in 2013. Presently, LBIC provides a broad imaging platform, data analysis, and visualization. Our goal is to integrate our cutting edge light microscopy, correlative and data-driven microscopy services into the SciLifeLab infrastructure.

Cellular and Molecular Imaging

Proposals on New Technologies p. 100-120

Proposals on New Infrastructure Units p. 121-137

059: Computational Analytics Support Platform (CASP) – data analytics service for life science researchers

Cellular and Molecular Imaging

Hans Stenlund, Acting Head of Unit (PhD), Umeå University
hans.stenlund01@umu.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers, Infrastructure (Swedish Metabolomics Centre (SMC))

The technology would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology
Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Drug Discovery and Development
Bioinformatics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, Computational Analytics Support Platform (CASP), Umeå University

Brief description of the technology:

The ability to analyse and draw valid conclusions from complex data sets, generated by high-throughput technologies, has become a bottleneck for many life science researchers. The shortage of skills required to analyse this flood of data has been recognised on both a national and local level.

To help bridge this gap locally, CASP was launched in 2021 at Umeå University, to primarily support but also train life scientists in the analysis of experimental data. CASP has supported a constant flow of researchers, both locally and nationally, from primarily academic, but also industrial settings.

CASP provides a unique set of tools primarily within multivariate data analysis, but also as relevant, AI/deep learning, pathway analysis, univariate statistics and statistical experimental design. These methods are applied to data from multiple technologies (e.g. metabolomics, proteomics, spectroscopy, imaging), contributing to CASP's diverse customer base from areas spanning disease diagnostics, infection biology, agriculture and environmental toxicology.

CASP also acts as a valuable extended support to the Swedish Metabolomics Centre (SMC), supporting users with the analysis and biological interpretation of data, both vital stages where users often require support and was previously difficult to find. CASP also supports the Vibrational Spectroscopy Core Facility and hopes to extend this to other SciLifeLab units i.e. Exposomics who have shown an interest in their service.

Estimated annual total funding (MSEK) needed from SciLifeLab:

CASP would require annual funding of 1 MSEK from SciLifeLab, to cover the salary costs of one member of staff dedicated to service.

Co-funding plans:
Support from Umeå University (including the Chemical Biological Centre):
2023-2024 – received 1.8 MSEK after being recognised as an infrastructure with potential to become of national interest
2025+ (estimate ~500 KSEK/year)

Future applications:
VR for research infrastructures of national interest (6 years funding (50% of total budget))
KAW – Proof of Concept Grant Program (2 years, 1-4 MSEK)

Income from user fees (estimate ~1 MSEK/year)
At present, user fees account for more than 50% of CASP's total revenue presenting CASP as a cost-efficient platform
Income from collaboration partners (estimate ~400 KSEK)

Additional comment:

Interdisciplinary expertise, domain expertise in both technology and life sciences, adds to the uniqueness of CASP, allowing support that goes

059: Computational Analytics Support Platform (CASP) – data analytics service for life science researchers (cont.)

Hans Stenlund, Acting Head of Unit (PhD), Umeå University
hans.stenlund01@umu.se

***Please note that this proposal is also found under other platforms*

beyond data analysis into the biological understanding of data. Their focus is on the analysis of biology readouts – phenotypic/non genomic data, making CASP complementary to bioinformatics support available at NBIS and the UPSC Bioinformatics Facility, who CASP hope to work alongside and together provide a strong support to the life science community.

060: Correlative Light and Electron Microscopy

Gayathri Vegesna, Dr., Umeå University
gayathri.vegesna@umu.se

Representing:

Infrastructure

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology

Is the technology currently available as local infrastructure service in Sweden?

Yes, Umeå university

Brief description of the technology:

The technology involves several different microscopes and steps. For a CLEM technology one needs to have access to certain light microscopes and electron microscope depending on the project and the requirement. And most of the microscopes might already be part of SciLifeLab but integrating all of them is the key for a successful CLEM workflow.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Cannot give an estimate, it really depends on the CLEM workflow and varies a lot between different workflows.

Additional comment:

None

061: Correlative live light superresolution microscopy plus cryo-electron tomography

Marta Carroni, PhD, Stockholm University
marta.carroni@scilifelab.se

***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher, Infrastructure

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

The field of structural biology has seen en explosion in the last 10 years with the rapid development of cryo-EM first and AlphaFold2. Even though it is easier to obtain information about the folding of specific proteins, it remains challenging to gather information about large protein assemblies, and even more, about their dynamics. It is then particularly interesting to learn about conformational changes in the cellular environment under varying physiological conditions. The structural biology world is developping into a phase of in-cell structural biology, where cryo-EM, cryo-ET, fluorescence light microscopy and in-cell NMR will all play a role. While several groups in the world are working in the field of correlative light and electron microscopy (CLEM) to identify specific events in the cell, very little is available in (i) correlation with superresolution light microscopy and (ii) correlation with live imaging in superresolution mode. These two modalities would make it possible to identify very precisely, with added information about the temporal dimension, cellular events while they are happening using superresolution imaging and then obtain near-atomic structural information by using cryo-EM/cryo-ET. At SciLifeLab CMI Solna, we have the uniquely combined knowledge in live superresolution microscopy and cryo-ET that would make it possible to develop a new correlative live superresolution cryo-EM technique. Instrumentation and dedicated personnel are needed.

Estimated annual total funding (MSEK) needed from SciLifeLab:

In the beginning, a first and simple initial set-up could be developed with ad hoc funding for instrumentation that needs to be combined in a unique way and with a dedicated person. For this first phase 1-2MSEK per year for 3 years could be enough considering co-funding. A second phase would imply the acquisition of very expensive instrumentation for milling of cellular specimen, capability not yet available in the cryo-EM node in Solna. This would imply a very large investment in the order of 40MSEK that should be co-funded by external funds as well as the universities interested.

Additional comment:

Cryo-EM is starting to undergo a new phase in the world and SciLifeLab needs to stay at pace with the rest of the world.

062: Cryo-CLEM (cryogenic correlative light and electron microscopy)

Alexander Mühleip, Dr, University of Glasgow
alexander.muhleip@glasgow.ac.uk

Cellular and Molecular Imaging

***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

I do not know

Brief description of the technology:

Correlative Light and Electron Microscopy (cryo-CLEM), is an advanced imaging technique that combines the strengths of two different microscopy methods: fluorescent Light Microscopy (LM) and Electron Microscopy (EM), while maintaining the sample at cryogenic temperatures. The technique allows the biological samples such as vitrified tissues, cell or cell fractions to be imaged in near-native state. Particularly when studying rare events, using fluorescence microscopy to identify the area of interest for subsequent electron microscopic imaging is of great importance. Establishing cryo-CLEM at the SciLifeLab facility would act as a linker between existing fluorescence and cryo-EM facilities/platforms and allow users to analyse samples, for example before subsequent imaging by cryo-FIB-SEM in external facilities (KI, Umeå).

Estimated annual total funding (MSEK) needed from SciLifeLab:

N/A

Additional comment:

None

063: Cryo-EM

Kajsa Paulsson, PI, University, Industry, Experimental Medical Science
kajsa_m.paulsson@med.lu.se

Cellular and Molecular Imaging
***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure coordinator FoM, LU + PI

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology

Is the technology currently available as local infrastructure service in Sweden?

Yes, Partly but the existing cryoEM needs to be complemented with tomography etc.

Brief description of the technology:

The existing cryoEM infrastructure, including CryoScreeNET is a fantastic asset for research in Sweden. CryoScreeNET has been working very well and I hope it will be potentiated and extended. The current services need be kept but at the same time adaptation to the international environment needs to be done. It will probably be necessary to very soon add capacity also for in situ structural biology and tomographic approach.

Estimated annual total funding (MSEK) needed from SciLifeLab:

1 MSEK

Additional comment:

None

064: Cryo-FIB at SciLifeLab Solna

Hongyi Xu, Researcher, Stockholm University
hongyi.xu@mmk.su.se

Cellular and Molecular Imaging
***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, SciLifeLab in Umeå (travelling with vitrified sample is difficult)

Brief description of the technology:

Sample preparation of lamellae of cells and micro crystals by cryo-FIB will greatly expand the capability of cryo-ET, MicroED and SerialED at SciLifeLab Solna.

Estimated annual total funding (MSEK) needed from SciLifeLab:

1 M SEK

Additional comment:

None

065: Development of analytical methods for non-model organisms

Cellular and Molecular Imaging

Olga Vinnere Pettersson, PhD, Uppsala University
olga.pettersson@scilifelab.uu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Planetary Biology Capability)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Bioinformatics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Planetary Biology
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

PB has conducted its own survey among its target community. Results suggest that the majority of technologies required to satisfy PB community needs are already present in SciLifeLab infrastructure. The main limitation, however, is that most of the applications are tailored to model organisms, or mammals only. The community seeks method/service development mainly from Genomics, Bioinformatics & Spatial Biology platforms.
Several service improvement suggestions have been made by the community.
Below we name a few, in order of significance:
-Genomics
Construction of cheap multiplex shotgun libraries for large-scale population genomics & metagenomics
Expanding capacity for making amplicon-based sequencing libraries for large-scale metabarcoding
Expanding DNA/RNA extraction service from non-models, as well as environmental samples; automatization of this service
Construction of genomics & epigenomics libraries from recalcitrant biological samples
Preserving microbial single-cell service
Increasing knowledge transfer with NGI regarding method development
-Bioinformatics
Development of new tools & pipelines for analysis of population-, metagenomic & transcriptomic sequencing data of non-models
Service & support in data preparation for, and submission to data repositories
Genome browser production for non-models
-Spatial Biology
Enabling application of spatial transcriptomics and proteomics to non-mammalian samples
-Metabolomics
Develop/extend reference libraries

Estimated annual total funding (MSEK) needed from SciLifeLab:

The PB recommendation is to focus on service/technological capability development: not to acquire new instrumentation, but to increase the number of FTEs at the existing facilities. Expansion of the current services to non-models will enable researchers to conduct high-impact research, but it requires hands-on development. The existing technological strength combined with strategic investment in human resources to conduct non-model technology R&D;, will allow SciLifeLab to pioneer method development in several areas. Users demand training from the technology platforms, but are also happy to share their know-hows with the infrastructure.

We suggest additional investigation into the necessary number of FTEs per each of aforementioned technology platforms to meet the PB community needs.

Additional comment:

This summary is based on discussion outcomes during the PB kick-off meeting, its follow-up, SciLifeLab day in Göteborg, as well as the PB-initiated survey of current SciLifeLab technologies and services circulated amongst Swedish researchers (including DDLS fellows).

Collection of survey responses is still ongoing and PB will prepare a report to the Management Board upon completion in this fall.

066: Electron cryo-tomography set up which includes: cryo-FIB-SEM enabled with CLEM (eg, Aquilos 2 Cryo-FIB, the Thermo Scientific iFLM Correlative System); a high pressure freezer

Cellular and Molecular Imaging

Vivek Singh, Dr., Karolinska Institutet
vivek.singh@ki.se

***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher (Joanna Rorbach lab, Karolinska Institutet)

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

As cryo-ET allows us to visualize macromolecular complexes in situ, this is the next logical step and can provide breakthroughs beyond the limitations of single particle (SP) cryo-EM.
Joanna Rorbach's lab (where I am post-doc) works with human mitochondrial protein synthesis. Many clinically relevant complexes such as ribosome assembly intermediates or inner membrane-bound actively translating ribosomes cannot be purified from cells as they are too unstable in vitro. We will soon be looking at a potential exhaustion of information that can be practically extracted with traditional SP cryo-EM.
To study these processes in situ we to directly freeze cell/tissue samples or purified mitochondria. Simple vitrification that the existing set up allows may work for purified organelles but unlikely to work for cells/tissues which require high pressure freezing. Even purified mitochondria are too dense and require FIB milling capabilities. Further, complexes of interest can be quite sparse and thus region of interest hard to locate. We can tackle this with a high through-put set up aided by an integrated cryo-confocal imaging.
These facilities are only partly available at 3D-EM facility at KI, Biomedicum so that it is doable but with slow through-put due to an older set up.
This is one of the urgently needed facilities, as many elsewhere have already started to invest heavily in this.
Thankyou!

Estimated annual total funding (MSEK) needed from SciLifeLab:

about 40-70 MSEK to acquire and set up the facility

Additional comment:

None

067: Equipment for in-situ structural biology sample preparation

Cellular and Molecular Imaging

Erik Lindahl, Professor, Stockholm University
erik.lindahl@scilifelab.se

***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher, A group of researchers

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Precision Medicine
Planetary Biology
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Cryo-EM has been success story for the world in general, and SciLifeLab in particular. However, some of the strongest current trends worldwide are towards imaging proteins in more realistic conditions, in particular entire parts of tissue/cells.

There are several new research projects in the pipeline at Stockholm university (as well as other sites) targeting e.g. Quantitative Whole-cell Biology by combining tomography and MINFLUX with new computational models (collaboration with UIUC) as well as new proposals to determine structure and processes of the entire synaptic transmission, and not least understanding how membrane protein function is modulated both by other proteins and surrounding tissue. These studies are consistently published in some of the highest-impact journals in the world, and the groups involved are frequently ranked at the very top of the grading scale e.g. in VR and ERC.

However, realizing this requires access to equipment both for FIB-milling, possibly so-called lift-out techniques, and techniques to combine cryo-EM with light microscopy (e.g. CLEM). We are approaching this more from the user side, but I am confident e.g. Marta Carroni is aware of the next-generation equipment available.

While FIB-milling is available to some extent in the Umeå facility, the Stockholm facility has consistently provided higher throughput, higher availability, and better user training – and I believe it is warranted to have relevant equipment there too.

Estimated annual total funding (MSEK) needed from SciLifeLab:

I believe this would require a combined effort where SciLifeLab e.g. funds 2MSEK/year (?) and external agencies contribute major infrastructure investments.

Additional comment:

None

068: FIB-SEM (Focused ion beam scanning electron microscopy)

Cellular and Molecular Imaging

Luca Jovine, Professor, Karolinska Institutet
luca.jovine@ki.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, Previous generation FIB-SEM systems exist at the Umeå node of SciLifeLab and the KI 3D-EM facility.

Brief description of the technology:

Since its establishment, the SciLifeLab cryo-EM facility in Stockholm has been arguably highly successful in enabling a large number of progressively more challenging single-particle projects. As a long time user, I believe that it would be a natural development for this facility to also acquire the ability to investigate by cryo-electron tomography and subtomogram averaging FIB-milled lamellae of cellular samples fixed by high-pressure freezing (HPF). The exciting type of studies enabled by these approaches are clearly where the future of structural biology lies, and having the option to also perform them at the Stockholm node of SciLifeLab would be of major value to all academic and industrial groups located in the Stockholm/Uppsala area and, more generally, the South of Sweden. In addition, it should be considered that the technologies underlying the HPF/cryo-FIB/ET pipeline are constantly being improved, and thus a de novo installation would allow Sweden to take advantage of the most recent developments and remain at the forefront of integrative structural biology.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Sorry, but I do not have this information. However, a clearly very important aspect is that the user fee should be kept within a reasonable range.

Additional comment:

As written above, to my knowledge there are two FIB-SEM systems available elsewhere in Sweden. However, because preparing samples for FIB-SEM remains highly challenging, physical proximity is often crucial, making it difficult for labs operating in the south of Sweden to take full advantage of the Umeå installation. The rapid technological developments in the field also make it highly desirable to obtain a latest generation system, beyond what is currently available in Umeå and at KI 3D-EM.

069: Infrared and Raman microscopy with focus on recent nanoscale technology

Cellular and Molecular Imaging

Andreas Barth, Prof, Stockholm University
barth@dbb.su.se

Representing:

An individual researcher

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging

The suggested technology would contribute to following capabilities:

I do not know

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

In general, microscopy at Scilife lab gives the impression to incorporate all modern microscopy techniques, but it ignores vibrational spectroscopy. Infrared nanospectroscopy has emerged as an exciting new technology which enables chemical mapping of surfaces with a resolution of 20 nm. Also protein secondary structure can be analyzed at this resolution. The instruments are expensive for a single research group (approx. 5-10 MSEK) and somewhat complicated to run. Thus there are only a few instruments in Sweden and Sweden lags behind other countries regarding this technology.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Ideally, three instruments would be bought from three manufacturers that work according to different principles. An upper estimate for this would be 20-30 MSEK. In addition, a salary for an expert to run the instruments would be required.

Additional comment:

None

070: Isolation and Characterization of Extracellular Vesicles

Cellular and Molecular Imaging

Maria Smedh, Site Coordinator, University of Gothenburg
maria.smedh@gu.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers, Infrastructure (SciLifeLab Gothenburg & the local Core Facilities)

The technology would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology
Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Extracellular vesicles (EVs) are small nano-sized vesicles released by all cells. EVs have been shown to play a major role in both health and disease such as homeostasis, cancer, inflammation, and neurodegenerative diseases. Importantly, in recent years their value to be used as therapeutics, biomarkers and vaccine has been highlighted and they have been extensively used in clinical trials. Publications have grown exponentially during the last years (over 6000 articles published during 2022) and there is now an increasing, unmet need from Swedish researchers to receive infrastructural support with high-quality isolation and characterization of EVs. Due to their nano-size, instruments built for cell analysis cannot be used and advanced instrumentation is needed for both isolation and characterisation of EVs. These instruments are usually expensive and requires specific competence. Here we present a close collaboration between the world leading research group within the EV field, led by Prof. Jan Lötvall, and the Core Facilities in Gothenburg including the SciLifeLab units Proteomics Core Facility and Centre for Cellular Imaging. Our aim is to provide the Swedish research community with the opportunity to isolate EVs followed by characterization with electron microscopy and/or ultrasensitive MS-based protein and RNA profiling as new world-leading capabilities within the SciLifeLab portfolio.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Personell: (2 x 40%) 850 tSEK
Premises: 70 tSEK (4500 SEK/ M2/Yr)
Instrument cost incl service: 400 tSEK
Running cost: 80 tSEK

Total cost: 1400 tSEK/ Yr

User fees: 400 tSEK
Co-finans: 250 tSEK

Applied funding SciLifeLab 750 tSEK/yr

Additional comment:

This service is decided to be implemented within the local Core Facilities infrastructure. It will be set up during the autumn and be operational at the end of the year.

071: Mass Spectrometry Imaging for Correlative and Functional Multimodal Bioimaging

Jörg Hanrieder, Associate Professor, University of Gothenburg
jh@gu.se

Representing:

A group of researchers (Researchers and Users within and outside Sweden)

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging

The suggested technology would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

MALDI mass spectrometry based molecular imaging (MSI) has gained immense significance in biomedical research allowing to spatially delineate metabolites, lipids, peptides and proteins in biological tissues at cellular (<5um) resolution. MSI exceeds critical limitations of classic bioimaging techniques such as IHC with respect to chemical specificity, selectivity, molecular targets and throughput. We propose to integrate MALDI MSI in the Centre for Cellular imaging (CCI/GU) as new technology within an existing SciLifeLab platform. A further advantage is the interaction with the metabolomics and proteomics labs at SciLife Gothenburg for ex situ validation and biomarker discovery.
A key strength adding the MSI technology at CCI is the integration with other imaging techniques available at CCI such as confocal-, lightsheet and super-resolution and electron microscopy along with data analysis solutions to integrate high content multimodal imaging data. As these modalities highlight different biological and chemical structures, and provide different spatial, temporal, and spectral resolution, an increasing number of researchers aims at maximizing the information extracted of biological specimen by using a suitable combination of techniques. It is a holistic approach that spans the entire resolution range from nano- to millimeters, and provides complementary information about the structure, function, dynamics, and the molecular composition of the sample at atomic resolution.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Key instruments including a Bruker Repiflex MALDI MS, all sample handling procedures and expertise are readily available at GU in the Hanrieder lab at Sahlgrenska hospital. Furthermore workflows and expertise for multimodal image integration, image analysis, multivariate statistics are readily established. Funding is requested for:

1. A Full-time engineer for MSI operation, troubleshooting, maintenance of the equipment and interface with customers
2. Running costs to cover MSI consumables, laboratory utilities, service, and expenses for the lab daily functioning

The total estimated budget from SciLifeLab: 1.2 MSEK/year

Additional comment:

Multimodal imaging is the most promising way to understand cells, cellular networks, organisms and diseases by deciphering their molecular mechanisms within their native context. MSI has been available at the CCI/GU facility since 2022 within a pilot in the EuroBioimaging-ERIC. CCI obtained requests for MALDI MSI and initiated pilot projects from >10 academic and industy customers within and outside Sweden of which some projects are still in pipeline as the high demand exceeds current resources.

072: Nanoscale secondary ion mass spectrometry (NanoSIMS)

Cellular and Molecular Imaging

Andrew Ewing, Professor, University of Gothenburg
andrewe@chem.gu.se

Representing:

A group of researchers (Researchers carrying out chemical nanoscopy.)

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging

The suggested technology would contribute to following capabilities:

Precision Medicine

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

The NanoSIMS at Gothenburg is Scandinavia's only facility for creating chemical images of biological molecules with 50 nm spatial resolution and zeptomole (10-21 moles) sensitivity, far surpassing other mass spectrometers. This size scale is crucial for scientists tackling pressing challenges in Life Science at the subcellular level. The University of Gothenburg (GU) currently operates the NanoSIMS in the AstraZeneca BioVentureHub, and was the first academic group to join this ecosystem. The value added by this innovative pairing of academia and industry has set a precedent for other academic groups such as OligoNova. Given the dynamic research landscape with recently established Ribocure, OligoNova, the GoCo Health Innovation City and the facility's current commitment to AstraZeneca there is a clear value for NanoSIMS to be included in SciLife lab. Specifically, there is a need to increase capacity to deliver critical data at scale. We propose to place the NanoSIMS lab under the operational umbrella of the highly successful Center for Cellular Imaging (CCI) at GU, a SciLifeLab facility. This integration would benefit CCI which is fully focused on advanced imaging methods supported by the highly specialised competence. In this platform it will be possible to support researchers in Sweden from sample preparation to data analysis, removing a significant barrier of entry to users unfamiliar with advanced imaging giving Sweden a significant advantage in early medical research.

Estimated annual total funding (MSEK) needed from SciLifeLab:

1,5 million SEK for Full-time engineer for NanoSIMS operation, troubleshooting, maintenance, interface with customers, and collaborate on science, and
running costs to cover NanoSIMS consumables, laboratory utilities, safety equipment, and expenses for the lab daily functioning.

Additional comment:

The NanoSIMS successfully served 26 users from academia, industry, and healthcare over the past 18 months, providing valuable applications in organelle chemical quantification and drug localisation in subcellular domains and numerous recent high-impact publications in e.g. Nature, ACS Nano, Angewandte Chemie. The NanoSIMS brings extensive multidisciplinarity with experts from different scientific disciplines providing innovation in, for example, the development of oligonucleotide therapeutics.

073: Plasma FIB

Lars-Anders Carlson, Dr., Umeå University
lars-anders.carlson@umu.se

Cellular and Molecular Imaging
***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher (In this case: my research group)

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

With the establishment of the national cryo-EM facilities in 2017, the Umeå node got one so-called FIB/SEM microscope. At that point, this was an "exotic" instrument used by a few groups for focussed ion-beam (FIB) milling, a novel sample preparation method for in situ cryo-electron tomography (cryo-ET). Since then, the interest in using this instrument has exploded, both for cryo-ET sample preparation, as well as for so-called volume imaging of resin-embedded cells and tissues.

While single-particle cryo-EM data collection capacity has increased massively at SciLife lab since 2017, the FIB milling capacity has not. The limited capacity has become a bottleneck to high-end in situ structural biology in Sweden. From the perspective of my own group, we are not currently able to do the kind of projects that we could do in 2017-2020, due to limited FIB/SEM access.

I propose to expand the cryo-EM platform with a new FIB/SEM instrument. Recently, a new generation of such instruments has been introduced to biological use. They are so-called "plasma-FIBs". This kind of instrument can in principle do the same things as the current FIB/SEM in Umeå. But their plasma beam is more powerful, allowing faster sample preparation and imaging of larger volumes. A plasma FIB operating alongside the current FIB/SEM instrument ("Scios") in Umeå would be an ideal combination, providing new capabilities at the cutting edge of cryo-EM.

Estimated annual total funding (MSEK) needed from SciLifeLab:

I am not sure, but here is an "order of magnitude" type of guess:

A service contract for this instrument is perhaps on the order of 0.3-1 MSEK/year.

I would defer to the cryo-EM platform if additional staff would be needed.

Of course, the up-front cost for instrument purchase is substantial. A ballpark guess is that a plasma FIB would cost on the order 20 MSEK. Note that the Umeå cryo-EM node (UCEM) has in the past been successful in securing instrument purchase funding from several sources including Wallenberg, Kempe foundations, VR and SciLife.

Additional comment:

For full disclosure: while I have written this from the point of view of my own research needs, I also have another role as the chair of the steering group of the Umeå Centre for Electron Microscopy (UCEM).

074: Plasma FIB

Thanat Chookajorn, Dr., Umeå University
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Cellular and Molecular Imaging
***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (The malaria research community at Umeå University)

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

I do not know

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

We propose Focused Ion Beam Scanning Electron Microscope (FIB-SEM), especially with the latest technology of Plasma FIB which allows faster and more productive structural-determining capacities. Conventionally, FIB-SEM captures volumetric cell components, detailing 3-D organellar ultrastructures. It has become a new powerful tool in generating lamellae (<300 nm cryo-section) for electron tomography. The data can be resolved by subtomogram averaging (STA) to obtain near-atomic resolution macromolecular structures. Currently, novel workflows have been developed to solve proteins structures with the best use case capable of showing a small molecule fitting into a large protein complex.
The standard FIB-SEM relies on Gallium which limits bulk milling and inadvertently becomes a productivity bottleneck. The new technology exploits plasma as a milling tool and successfully creates suitable tomograms for protein structure determination with larger volume and at faster rate. Plasma FIB currently does not exist in Sweden. The malaria research community is using FIB-SEM and STA to solve structures of unknown organelles and macromolecular complexes with success. For example, a crystalloid organelle which is needed for malaria transmission was delineated by these approaches, correcting a 50-year old misconception and creating new malaria intervention strategies. Explorations in more mechanisms are limited by the availability of only one Gallium-based Scios FIB-SEM currently in use.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Not available.

Additional comment:

I write this proposal on behalf of the malaria team at Umeå University. The rise in the structural determination technology using STA has made the Scios FIB-SEM at the SciLifeLab UCEM extremely busy. One often needs to wait a few months for booking. The long operating time with few samples per session has significantly delayed research progress. Getting a new FIB-SEM is imperative, and the latest Plasma FIB technology would solve the throughput bottleneck of the Gallium FIB equipment.

075: Plasma FIB-SEM

Cellular and Molecular Imaging

Sara Henriksson, First research engineer, Umeå University
Sara.henriksson@umu.se

Representing:

Infrastructure

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

We currently have one FIB-SEM at our facility which is partly used by the IMT-UMU node for vEM but also by the cryo-EM unit for sample preparation. Obiously, it is a very fully booked instrument that is not ideal for any users. The latest technologies in this field are plasma FIB-SEM, which can operate both at a higher speed than conventional FIB-SEM but also improve the results. There is currently no such machine available in Sweden, and investing in this instrument would be a good complement to the already existing FIB-SEM microscope within Scilifelab.

Estimated annual total funding (MSEK) needed from SciLifeLab:

1 MSEK

Additional comment:

None

076: Plasma focused ion beam (FIB) scanning electron microscopy (-SEM) and additional volume imaging scanning instrument (e.g micro-CT)

Linda Sandblad, Facility Director, Researcher, PI, Umeå University
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***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure

The technology would fit in the SciLifeLab Platform(s):

Spatial Biology
Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Planetary Biology
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Focused Ion Beam (FIB) Scanning Electron Microscopy (-SEM) for cellular volume imaging is an emerging methods, high demand from experienced Cryo-EM user groups, molecular and cell biologists in all fields; marine biology, plant science to medicine! Current FIB-SEM instrument (only) one at Umeå University is heavily used for all application, to continue to stay at the forefront of technology development facility and facility users would like to upgrade the Swedish facility with a new Plasma FIB-SEM, operating under ideal cryo-conditions, fast, for cryo-lamella, volume sections from cells and tissue, preparation as main, focus application. And to fulfil further cell biology need, to image larger cellular volumes and cell-cell interactions FIB volume-scope will make the, today slow, FIB volume imaging data collection more accessable, produce larger volumes to study, infection and cel cel communication and will free time for other applications. To the family belongs a third micro-CT instrument (for non-destructuve volume imaging at low resolution, but for samples of 1 cubic mm dimension), which could map the large (compared to EM dimensions) cell and tissue volumes in 3D prior to FIB-SEM milling, which is high resolution of a small volume, around 1 cubic microM. for example to localize/trace a cancer cell in tissue.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Facility staff: 1 M SEK per year, service contracts: 0,5 M SEK per year. Facility premises and lab consumables 0,5 M SEK per year.

Additional comment:

Currently one FIB-SEM is available in Sweden for life science applications.
Investment for new instruments: Plasma FIB: 15-35 M SEK, FIB volume scope: 10M SEK, Micro-CT: 3M SEK (only estimation)

077: Preclinical Multimodal Imaging Systems (PMIS)

Eva Forssell-Aronsson, Professor, University, Health care, Sahlgrenska University Hospital
eva.forssell_aronsson@radfys.gu.se

Cellular and Molecular Imaging
***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher, A group of researchers, Infrastructure (Sahlgrenska Bioimaging Center, ca 30 groups)

The technology would fit in the SciLifeLab Platform(s):

Spatial Biology
Cellular and Molecular Imaging
Drug Discovery and Development
Bioinformatics

The suggested technology would contribute to following capabilities:

Precision Medicine

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Precision medicine is rapidly evolving and state-of-the-art pre-clinical imaging infrastructures are critical to accelerate translational research and clinical implement. Access to Next-Generation imaging systems that enable simultaneous acquisition from several imaging modalities in longitudinal studies is a current gap in research infrastructure in Sweden.

We have secured funding for a state-of-the-art Pre-clinical Multimodal Imaging System (PMIS) with MRI (magnetic resonance imaging), PET (positron emission tomography), SPECT (single photon emission tomography), and CT (computer tomography), and functional ultrasound (US). The imaging infrastructure will be nationally unique and internationally competitive with MRI, PET, SPECT and CT delivered by the same vendor, enabling simultaneous acquisition from two image modalities and the possibility of subsequent imaging in the same position with the other modalities. This enables true multimodality imaging in order to fully correlate imaging data from all four modalities. Furthermore, the US system is unique in Sweden and has very high sensitivity and spatiotemporal functional resolution with real-time imaging possibility.

The new PMIS at SBIC will attract a broad user base across academia, healthcare and industry nation-wide. Multimodality imaging is crucial for localisation of biomarker expression, in drug development and other types of translational research and helps to bridge the gap from research to clinical routine.

Estimated annual total funding (MSEK) needed from SciLifeLab:

The new cutting-edge imaging technology (PMIS) will be part of SBIC at Experimental Biomedicine (EBM), within Core Facilities (CF) at University of Gothenburg. SBIC will be fully integrated with CFs well established, open access research, with a vast experience in successfully running national research infrastructures. We seek funding of salary costs to enable the platform to operate as a national infrastructure within SciLifeLab. This includes a Platform Scientific Director (20% FTE, 0.38 MSEK), a Platform Manager (50%FTE, 0.59 MSEK) and an administrative support (20%FTE, 0.18 MSEK), at a total cost of ~1.1 MSEK annually.

Additional comment:

The Bioimaging Center at EBM was founded in 2002 as part of the SWEGENE project - a regional infrastructure in the South-West of Sweden, and later continued as a local infrastructure for researchers in academia, healthcare and industry in the Gothenburg area.

The procurement of the new state-of-the-art PMIS described here is in late phase. The eqiopment will be installed in the refurbished imaging facility at EBM during 2024.

078: Tailored services for precision medicine to bridge the gap between bedside and bench

Kaska Koltowska, Associate Professor, Uppsala University
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***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (I represent 20 research groups across Sweden)

The technology would fit in the SciLifeLab Platform(s):

Clinical Genomics
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, DanioReadout at Uppsala University has these services

Brief description of the technology:

DanioReadout is a ground-breaking service platform based at Uppsala University with a visionary goal to revolutionise precision medicine and bridge the gap in healthcare treatment development. DanioReadout is dedicated to developing unique, customer-tailored services to enable rapid and accurate disease modelling and therapy development.

The key to success lies in its utilisation of zebrafish as a versatile and cost-effective model system, with AI operated image analysis, high-through disease modelling, and drug screening. Unlike traditional murine studies, zebrafish offers a range of advantages, making it an ideal candidate for drug testing and estimation of systemic and toxicological effects. Compliant with the 3R principles, zebrafish embryos are not considered research animals reducing the use of higher-order animals in research.

The future success of DanioReadout is strongly routed in the impressive track record. So far over 50 Swedish and international research groups have used the platform's advanced services, resulting in 40 completed projects.

As we embark on the journey towards precision medicine, data driven science for innovative treatment solutions, DanioReadout stands as a guiding light of assurance. By unlocking the functional understanding of genetic discoveries at an unprecedented scale and cost-efficiency, this service platform embraces the future of healthcare and beckons a new era of transformative breakthroughs for patients and researchers alike.

Estimated annual total funding (MSEK) needed from SciLifeLab:

The estimated total annual funding required is between 2,5 MSEK to 3MEK depending on the level of income from the user fees (which could come up to 0.5 MSEK at the beginning and scale up over the years). To effectively run this service the team requires a project coordinator (100%), research assistant (100%), research assistant (50%), and image analyst (20%), to salary costs sum up to 1,7MSEK. The direct costs are 0,6MSEK and the local costs and indirect costs to 0,7MSEK.

Additional comment:

Under new organisational management, DanioReadout will be at the Department of Immunology, Genetics and Pathology (Medical Faculty, Uppsala University). The operational director will be Beata Filipek-Gorniok, to ensure the continuity of services and efficient project coordination. Kaska Koltowska will be a Scientific Director working together with the advisory board (Carolina Wählby (IT), Aristidis Moustakas (IMBIM), Joakim Holmdahl (CIV), Staffan Svärd (ICM), Johan Ledin (FOI))

079: Bio-Imaging SIMS

John Fletcher, Prof., University of Gothenburg
john.fletcher@chem.gu.se

Cellular and Molecular Imaging
***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers

The facility would fit in the SciLifeLab Platform(s):

Spatial Biology
Cellular and Molecular Imaging

Facility location:

University of Gothenburg

Contact person for the facility:

john fletcher

Contact person email address:

john.fletcher@chem.gu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

The Bio-Imaging SIMS facility is a local facility housed within the Department of Chemistry and Molecular Biology at the University of Gothenburg (GU). GU is recognised internationally as a leading centre for the development and application of bio-imaging SIMS. The facility houses a 15 Mkr imaging SIMS instrument, sample preparation equipment and data handling computers capable of performing the demanding analysis of the hyperspectral image data that is generated, in a data driven life science approach.
SIMS combines the chemical specificity of mass spectrometry with high spatial resolution provided by the use of focused ion beams to probe the sample. The approach provides molecular information with sub-cellular resolution and is used for mapping small molecules and elements within cells and tissue samples including cryogenically preserved specimen. It is complementary to other imaging modalities in the microscopy and spatial omics arena.
The unique advantages of the facility over existing ScilifeLab facilities are high spatial resolution mass spectrometry images (down to ca. 200 nm), surface sensitive information allowing cell membrane chemistry and interactions to be probed specifically, 3D cellular imaging and the ability to detect both molecular and elemental species.
In recent years research application areas have inculded cancer, cardiovascular, neuroscience and antibiotic resistance research in collaboration with academic and clinical researchers.
Incorporation into SciLifeLab would allow the facility to meet existing and future demand and expand the current capabilities of the facility keeping Swedish research competitive and providing access to novel technology in line with other bio-research leading nations where SIMS is becoming increasingly incorporated into life science infrastructures.
The most logical fit within SciLifeLab would be under the Spatial Biology umbrella although there is also overlap with the Cell and Molecular Imaging platform.

How is the facility providing infrastructure services today?

I do not know

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

1.2 Mkr per year would allow the facility to dedicate technical support for running samples, processing data and performing training for walk up/repeat users.
Servicing and maintenance of the instrumentation requires 0.5 Mkr annually.
Hence, an open service could be offered for ca. 1.7 Mkr. However, this does not take into account the need to upgrade and eventually replace the instrumentation or purchase additional software licenses to support increased user numbers. It also assumes funding of premises costs by the Department of Chemistry and Moleclar Biology in the newly constructed Natrium building in Gothenburg.
Hence, additional applications for instrumentation funding and the setting of non-prohibitive users

fees would be used to create a sustainable platform.

Additional comment:

None

080: Computational Analytics Support Platform (CASP)

Kate Bennett, Platform Manager (PhD), Umeå University
katie.bennett@umu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Computational Analytics Support Platform (CASP))

The facility would fit in the SciLifeLab Platform(s):

Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Clinical Proteomics and Immunology
Drug Discovery and Development
Bioinformatics

Facility location:

Umeå University

Contact person for the facility:

Dr Kate Bennett

Contact person email address:

katie.bennett@umu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

The Computational Analytics Support Platform (CASP) is a data analytics service at Umeå University that primarily supports, but also trains life scientists in the analysis of experimental data, helping researchers unravel complex chemical and biological systems.

Since the platform began in 2021, CASP has supported researchers locally and nationally from diverse research backgrounds including health and disease, environmental toxicology, pharmaceuticals, agriculture and infection biology. CASP also acts as a valuable support to the Swedish Metabolomics Centre, supporting users with both the analysis and biological interpretation of data.

Their focus is on the analysis of phenotypic/non-genomic data from a wide range of technologies including, but not limited to, downstream omics (metabolomics/proteomics), spectroscopy and imaging. CASP provides researchers with advanced data-driven tools and strategies primarily within multivariate data analysis, but also AI/deep learning, univariate statistics, pathway analysis and statistical experimental design.

The uniqueness of CASP arises from their interdisciplinary nature. Combined, the group have strong expertise in data-driven life science, not only understanding statistics and modelling, but have wide domain knowledge arising from active engagement in numerous projects particularly in the ‘omics’ area and beyond. This allows for a full understanding of the researcher’s needs, not only in terms of the data analysis, but also in how the data was generated and equally important, the interpretation of the biology behind the project. Support can be provided from day one starting with experimental design, quality control of generated data, basic to in-depth data analysis, through to interpretation of results and publishing.

CASP’s mission is to help bridge the existing gap in data-driven life science by continuing to provide a valuable and much needed support to the life science community in Umeå and beyond.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility, Providing services to researchers primarily from Umeå University and other Swedish Universities.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

CASP would require annual funding of 1 MSEK from SciLifeLab, to cover the salary costs of one

Kate Bennett, Platform Manager (PhD), Umeå University
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***Please note that this proposal is also found under other platforms*

member of staff dedicated to service.

Co-funding plans:

Support from Umeå University (including the Chemical Biological Centre):
2023-2024 – received 1.8 MSEK after being recognised as an infrastructure with potential to become of national interest
2025+ (estimate ~500 KSEK/year)

Future applications:
VR for research infrastructures of national interest (6 years funding (50% of total budget))
KAW – Proof of Concept Grant Program (2 years, 1-4 MSEK)

Income from user fees (estimate ~1 MSEK/year)
At present, user fees account for more than 50% of CASP's total revenue presenting CASP as a cost-efficient platform
Income from collaboration partners (estimate ~400 KSEK)

Additional comment:

CASP aims to provide researchers with services and expertise complementary to those offered by existing bioinformatics support platforms including the SciLifeLab Platform NBIS. Together, CASP aims to contribute to a stimulating work environment within the DDLS Data area node, which will be hosted at UmU, with CASP fitting perfectly in to three of the strategic DDLS research areas; Epidemiology and Biology of Infection, Cell and Molecular Biology and Precision Medicine and Diagnostics.

081: Correlative imaging at UCEM and BICU

Cellular and Molecular Imaging

Linda Sandblad, Facility Director, Researcher, PI, Umeå University
linda.sandblad@umu.se

Representing:

An individual researcher, A group of researchers, Infrastructure

The facility would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging

Facility location:

Umeå University

Contact person for the facility:

Richard Lundmark and Linda Sandblad

Contact person email address:

richard.lundmark@umu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

Correlative light and electron microscopy (CLEM) uses a combination of visible and fluorescent labeling techniques with high resolution electron microscopy, to localize a region, protein or event of interest, spatially and/or temporally, combining all accessible light and electron microscopy methods, immuno-labeling, tomography and volume imaging and cryo-EM. CLEM service is a user support, a "know-how" service on project based method application/work-flow, using instruments form both local and national infrastructures. BICU (Biochemical Imaging Centre in Umeå) specialized on light and atomic force microscopy and UCEM specialized on electron microscopy. The service/support is based on the method, rather than instrument. The service is very attractive, and has recently also used by visiting groups, visiting professors, spending 1 week or up to 3 months at the SciLifeLab site Umeå using multiple facilities, services simultaneously. The association to EuroBioImaging has provided a great European network, monthly zoom meetings, possibilities for training and joint method development across European imaging facilities.

How is the facility providing infrastructure services today?

As a national facility, Organisational as BICU (Biochemical Imaging Cetre Umeå) Part of the national Microscopy Infrastructure (NMI), and EuroBiolomaging - international facility service

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

2 M SEK in total; approximately 1 MSEK for facility manager and 1 MSEK for premisses and lab consumables.

Additional comment:

None

082: IVMSU

Neus Visa, professor, Stockholm University
neus.visa@su.se

Representing:

University leadership, Other (Dept Molecular Biosciences, Wenner-Gren Institute)

The facility would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging

Facility location:

Frescati campus, SU

Contact person for the facility:

Christiane Peuckert, facility manager

Contact person email address:

ivmsu@su.se

Current number of unique users annually:

1-10

The suggested facility would contribute to following capabilities:

Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

The IntraVital Microscopy facility of Stockholm University (IVMSU) is a unique open-access platform for two-photon microspectroscopy. It offers unique possibilities for monitoring dynamic and spatial interactions between microorganisms and biological or non-biological materials with nm resolution in cm-to-dm wide samples.
IVMSU's combination of non-damaging pulsed infrared laser, deep optical sectioning, multiple spectroscopies (excitation, emission and lifetime) and semi-automated large data-acquisition makes it possible for researchers to address challenging questions in a broad range of disciplines including:

Medical and Infection Biology
IVMSU offers the possibility to directly study the localization, dynamics and activity of microorganisms in living cells, tissues and organs, while preserving the native physiological context. This approach is particularly attractive for studies of pathogen-host interactions and evaluation of treatment effects as well as beneficial microbiome-host interactions.

Material Sciences
IVMSU has the capacity to perform deep imaging in various materials using optical sectioning to enable 3D-imaging in room temperature in totally native conditions. Such imaging is ideal for the fine characterization of the organization and composition of novel sustainable biomaterials and to evaluate their interactions with living organisms.

Planetary Biology
IVMSU has the unique capacity to set the spatial and temporal scales governing interactions and responses between microorganisms and higher pluricellular organisms at cellular to subcellular levels. The possibility to study life in its physiological context makes it possible to manipulate the environment experimentally and interrogate the impact of the environmental challenges on essential biological processes.

How is the facility providing infrastructure services today?

As a national facility, IVMSU is a funding node of the National Microscopy Infrastructure NMI (http://nmisweden.se/).

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

IVMSU is currently funded by:
- VR (as part of NMI)
- Department of Molecular Biosciences, Wenner-Gren Inst (MBW)
- Faculty of Science at SU (as part of Experimental Core Faciltiy ECF)
- External funding: VR-3R grant to Christiane Peuckert, facility manager
- External funding: grant from the Stiftelsen Wallenberglaboratoriet och Biologilaboratoriet
- User fees

Detailed financial statement and budget can be provided on request.

NMI (including IVMSU) has submitted an

Neus Visa, professor, Stockholm University
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application to VR (Bidrag till forskningsinfrastruktur av nationellt intresse) for continued funding, decision late 2023. The annual funding needed from SciLifeLab to enable IVMSU to offer national service within the SciLifeLab is in the range 1.5-3 MSEK, depending on the outcome of the VR application.

Additional comment:

IVMSU is nationally unique.
IVMSU is located in the Experimental Core Facility at MBW/SU and can image a broad range of living and non-living samples. It operates under BSL2 standard and offers support for long-term experiments.
IVMSU's integration would increase exposure and accessibility, and would increase user base.
IVMSU would complement other SciLifeLab units by providing the spatio-temporal context and a means to validate hypothesis concerning microorganism-sample interactions.

083: IVMSU

Antonio Barragan, prof, Stockholm University
antonio.barragan@su.se

Representing:

A group of researchers

The facility would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging

Facility location:

SU campus

Contact person for the facility:

christiane Peuckert

Contact person email address:

christiane.peuckert@su.se

Current number of unique users annually:

I do not know

The suggested facility would contribute to following capabilities:

Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

The IntraVital Microscopy facility of Stockholm University (IVMSU) is a unique open-access platform for two-photon microspectroscopy. It offers unique possibilities for monitoring dynamic and spatial interactions between microorganisms and biological or non-biological materials with nm resolution in cm-to-dm wide samples.
IVMSU's combination of non-damaging pulsed infrared laser, deep optical sectioning, multiple spectroscopies (excitation, emission and lifetime) and semi-automated large data-acquisition makes it possible for researchers to address challenging questions in a broad range of disciplines, such as

Medical and Infection Biology
IVMSU offers the possibility to directly study the localization, dynamics and activity of microorganisms in living cells, tissues and organs, while preserving the native physiological context. This approach is particularly attractive for studies of pathogen-host interactions and evaluation of treatment effects as well as microbiome-host interactions.
Material Sciences
IVMSU has the capacity to perform deep imaging in various materials using optical sectioning to enable 3D-imaging in room temperature in totally native conditions. Such imaging is ideal for the fine characterization of the organization and composition of novel sustainable biomaterials and to evaluate their interactions with living organisms.
IVMSU has the unique capacity to set the spatial and temporal scales governing interactions and responses between microorganisms and higher pluricellular organisms at cellular to subcellular levels.
IVMSU is nationally unique.
IVMSU is located in the Experimental Core Facility at MBW/SU and can image a broad range of living and non-living samples. It operates under BSL2 standard and offers support for long-term experiments.

How is the facility providing infrastructure services today?

As a national facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

NA

Additional comment:

None

084: IVMSU (The IntraVital Microscopy facility of Stockholm University)

Cellular and Molecular Imaging

Keira Melican, Docent, Karolinska Institutet
keira.melican@ki.se

Representing:

A group of researchers (AIMES, and my research Team)

The facility would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging

Facility location:

Stockholm University

Contact person for the facility:

Christiane Peuckert

Contact person email address:

christiane.peuckert@su.se

Current number of unique users annually:

I do not know

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

I do not know

Brief description of the facility:

The IntraVital Microscopy facility of Stockholm University (IVMSU) is a unique open-access platform for two-photon microspectroscopy. It offers unique possibilities for monitoring dynamic and spatial interactions between microorganisms and biological or non-biological materials with nm resolution in cm-to-dm wide samples.
IVMSU's combination of non-damaging pulsed infrared laser, deep optical sectioning, multiple spectroscopies (excitation, emission and lifetime) and semi-automated large data-acquisition makes it possible for researchers to address challenging questions in a broad range of disciplines,
Importantly for our work: Medical and Infection Biology
IVMSU offers the possibility to directly study the localization, dynamics and activity of microorganisms in living cells, tissues and organs, while preserving the native physiological context.
This approach is particularly attractive for studies of pathogen-host interactions and evaluation of treatment effects as well as microbiome-host interactions. This is a uniques facility that allows us to use dynamic intravital imaging of BSL2 infectious agents and even in combination with animal studies

IVMSU is located in the Experimental Core Facility at MBW/SU and can image a broad range of living and non-living samples. It operates under BSL2 standard and offers support for long-term experiments.

How is the facility providing infrastructure services today?

As a national facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

i do not know

Additional comment:

None

085: LU-Fold

Gemma Atkinson, Dr, Lund University
gemma.atkinson@med.lu.se

Cellular and Molecular Imaging
***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher, A group of researchers, Infrastructure (LU Fold facility at Lund University, and my group)

The facility would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Cellular and Molecular Imaging
Integrated Structural Biology
Bioinformatics
I do not know

Facility location:

Lund University

Contact person for the facility:

Gemma Atkinson

Contact person email address:

gemma.atkinson@med.lu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

LU-Fold is a new Lund University-based facility for helping researchers predict protein structures of interest using the cutting-edge method AlphaFold2 (Nature Methods method of the year, 2021). LU-Fold specialises in high-throughput prediction of protein complexes to predict novel protein-protein interactions. For example, we can predict pairwise interactions of a protein of interest with all other proteins in a proteome to find new binding partners and molecular binding interfaces.

We run as a service, using national high performance computing infrastructure to make high-throughput structural predictions. Users do not have to have any previous bioinformatics or structural biology experience.

Our services include prediction of:
– pairwise binding interactions of a protein of interest with all other proteins in a proteome
– structures of all proteins in a proteome (for instance from a newly sequenced genome)
– higher order structures of larger complexes
– the effects of mutations and truncations on proteins

We also offer training through workshops, tutorials and online guides to help others make predictions, compare structures, visualise results and make publication-quality figures.

This novel service was urgently needed and is receiving significant interest. The facility officially starts in August 2023, and until then the Atkinson lab has been initiating pilot projects within the scope of local and national collaborations. So far we have been collaborating on projects that e.g. find interactions of virus proteins with the human proteome, predict oligomers of bacterial cell division proteins, discover binding partners of proteins associated with childhood cancer neuroblastoma, and predict interactions of proteins involved in neurological disorders. We have made connections with researchers at MAX IV, and the SciLifeLab Cryo-EM and Structural Proteomics units in Lund, who see ample opportunities for partnership and knowledge sharing.

How is the facility providing infrastructure services today?

As a local core-facility, Currently funded solely by Lund University

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

The major cost is salaries as we do not rely on very expensive local equipment and consumables. Currently we have one engineer serving Lund University alone. To offer the service nationally, we

would need at least one more staff member, plus at least a 20% director position. Overhead, rent and small running costs are additional budget expenses. As a rough estimate, the total cost of a (minimal) national LU-Fold facility would be between 3 and 3.5 million per year.

We predict it would take a SciLifeLab investment of at least around 1.5-2 million per year to make LU-Fold nationally available. This assumes LU-Fold funding from Lund University remains the same at around 1 million per year, plus some cost recovery with user fees (potentially around 600 000 per year).

Additional comment:

SciLifeLab support of LU-Fold would strategically benefit both entities. For LU-Fold, the additional investment would aid sustainability and ability to help more researchers. For SciLifeLab, with LU-Fold's connection to structural biology, proteomics, genetics, and bioinformatics, there is significant added value, with many opportunities for synergies and integration with other existing SciLifeLab platforms. Education and training activities could be integrated with the SciLifeLab Training hub.

086: Lund University Bioimaging Centre

Sebastian Wasserstrom, PhD, Lund University
sebastian.wasserstrom@med.lu.se

Cellular and Molecular Imaging
***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Lund University Bioimaging Centre)

The facility would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Spatial Biology
Cellular and Molecular Imaging
Integrated Structural Biology

Facility location:

Lund University

Contact person for the facility:

Sebastian Wasserstrom

Contact person email address:

sebastian.wasserstrom@med.lu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

LBIC has strategically invested in light-sheet microscopy and optical clearing since 2019, acquiring two systems and adopting various clearing techniques, including a recent high-throughput commercial clearing system purchase.
Collaborations with other infrastructures and research groups with specialized microscopes further enhance LBIC's value. These include live pathogen and high-throughput imaging platforms. For instance, in partnership with the Centre for Translational Genomics, LBIC is preparing workflows for spatial transcriptomics and single-cell NGS using 10X Genomics Visium and Takara ICELL8 cx Single-Cell System, available from late 2023. LBIC is also collaborating with Lund University's Pontus Nordenfelt group and Cytely AB to implement data-driven microscopy. This innovative concept, developed by the Nordenfelt group, integrates data-independent and data-dependent steps, enhancing live-cell imaging, reducing bias, increasing reproducibility, aligning with the SciLifeLab & Wallenberg Nat. Data-Driven Life Science initiative. In June, LBIC and the Dep. Exp Med Sciences jointly procured a 120kV Transmission Electron Microscope and a 200kV Cryo Electron Microscope. This adds opportunities for ultra-high-resolution microscopy and correlative workflows at the medical faculty and integrates with the CryoScreeNET, facilitating preliminary experiments before imaging at the SciLifeLab Cryo-EM sites in Stockholm and Umeå. LBIC personnel will be trained to operate and support these systems.
Integrating the above described components into SciLifeLab's infrastructure services will expand LBIC's impact to a larger base of national medical researchers and would offer unique large sample light microscopy and data-driven microscopy workflows for researchers in southern Sweden. Leveraging its current position, LBIC is well-equipped to deliver services aligned with multiple SciLifeLab platforms, meeting diverse medical researchers' advanced requirements.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility, LBIC is an imaging resource available to preclinical and clinical research groups at Lund University, Region Skåne as well as external organizations and companies. LBIC hosts a large variety of advanced preclinical and clinical imaging equipment and techniques ranging from micro to macro.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Estimated annual funding needs is 1.5 MSEK to cover two 50% research positions.
Co-funding: LU Medical faculty and private funding and ALF (Region Skåne).
An estimated 25% of running costs will be covered by user fees.

Additional comment:

086: Lund University Bioimaging Centre (cont.)

Sebastian Wasserstrom, PhD, Lund University
sebastian.wasserstrom@med.lu.se

Cellular and Molecular Imaging
***Please note that this proposal is also found under other platforms*

Established in 2008, Lund University Bioimaging Centre (LBIC) primarily specialized in in vivo imaging with a focus on open access and expert staff. Initially consisting of MRI and PET/SPECT platforms, LBIC added electron microscopy in 2010 and light microscopy in 2013. Presently, LBIC provides a broad imaging platform, data analysis, and visualization. Our goal is to integrate our cutting edge light microscopy, correlative and data-driven microscopy services into the SciLifeLab infrastructure.

087: PET & MR

Erika Comasco, Fellow, Uppsala University
erika.comasco@neuro.uu.se

Cellular and Molecular Imaging

Representing:

An individual researcher

The facility would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging

Facility location:

Akademiska

Contact person for the facility:

Gunnar Antoni

Contact person email address:

gunnar.antoni@ilk.uu.se

Current number of unique users annually:

I do not know

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

I do not know

Brief description of the facility:

PET and MR scanner for humans; the availability of PET and MR scanners, as well as of the PET-MR scanner and staff available for radioligand synthesis is currently the major limitation to neuroimaging research at UU.

How is the facility providing infrastructure services today?

As a local core-facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

I do not know

Additional comment:

None

088: ProLinC

Gunhild Maria Selander Sunnerhagen, professor, Linköping University
maria.sunnerhagen@liu.se

Cellular and Molecular Imaging
***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher, A group of researchers, Infrastructure (The ProLinC Biophysics Infrastructure in MOSBRI.eu)

The facility would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology
Bioinformatics

Facility location:

Linköping University

Contact person for the facility:

Maria Sunnerhagen, Dean Derbyshire

Contact person email address:

maria.sunnerhagen@liu.se

Current number of unique users annually:

10-50, More than 50

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

The LiU core facility ProLinC (liu.se/en/research/prolinc) is the Swedish node in the Horizon-2020 Molecular-Scale Biophysics Infrastructure that includes 13 academic state-of-the-art core facilities across Europe (mosbri.eu/partners/). ProLinC is a stakeholder in the SciLifeLab Integrated Structural Biology platform (ISB), and its NMR resource form part of SwedNMR (VR-infra). ProLinC at LiU uniquely offers a dedicated user facility including staff scientist support, making it possible for SciLifeLab users to fully explore their protein/complex properties and refine conditions for downstream applications, as well as explore the nature and dynamics of its interactions. ProLinC holds a near-complete set of instrumentation for the biophysical analysis of proteins and their interactions, quality assessment of biologics, and high-end fluorescence microscopy including hyperspectral options. ProLinC actively sustains transnational access (TNA) through MOSBRI as well as joint research activities in protein/peptide molecular studies and its applications within cancer, regenerative medicine and neurodegenerative and infectious diseases. When needed, our research environment fulfils Biosafety requirements for prion research. The main added value provided by ProLinC rests in the joint facile access to complementary and advanced biophysical techniques and to competence in their use, which is much appreciated by both academics and industry. Within SciLifeLab ISB, ProLinC provides user training in complementary biophysical techniques for protein QC as well as functional investigations. ProLinC actively supports WCMM users and provides essential data for AI-based protein structure and docking in the DDLS program. ProLinC has received supported by VR, SFF and ILL in maturing biomedical projects for neutron analysis using advanced pre-analysis by biophysical tools, thereby facilitating access for Swedish biomedicine to X-ray and neutron as well as cryo-EM and NMR infrastructures.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility, As a European and local infrastructure facility in Biophysics, and as part of a national facility for NMR (SwedNMR, the ProLinC NMR part only.)

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Today, ProLinC user access is enabled by combined LiU support and LiU user fees (since 2018, lims.ifm.liu.se) to primarily serve users at LiU and in the national WCMM and DDLS research networks where LiU is engaged. During 2022-2025, European access to ProLinC is fully supported by MOSBRI.eu. Today, national and industry users have to pay full cost coverage since 50% of staff and running costs are co-funded by LiU. To offer nation-wide service at LiU-level service fees, an annual SciLifeLab co-funding at

1.2 MSEK/yr is needed for staff/head-of-unit support and extra maintenance and service costs. Integration of ProLinC in SciLifeLab will enhance its node synergies (below) and ensure a continued, funding-competitive Swedish Biophysics platform in upcoming EU infrastructure programs.

Additional comment:

SciLifeLab ISB and Protein Production Sweden (PPS, VR) have jointly identified the need for supported, national user access to ProLinC for advanced protein QC, to meet required sample quality for downstream analysis (X-ray/Neutron, cryo-EM, NMR and other) and upcoming publication standards (https://p4eu.org/protein-quality-standard-pqs/). Full integration of ProLinC in SciLifeLab will facilitate exploring novel synergies between SciLifeLab nodes and with DDLS and WCMM research platforms.

089: X-Ray Diffraction Facility

Uwe Sauer, Assoc. Prof., Umeå University
uwe.sauer@umu.se

Cellular and Molecular Imaging
***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (X-Ray Diffraction Facility (XRDF), KBC UmU)

The facility would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology
Drug Discovery and Development
Bioinformatics

Facility location:

Chemical Biology Centre KBC & Dept. of Chemistry, Umeå Univ.

Contact person for the facility:

Dr. Uwe Sauer

Contact person email address:

uwe.sauer@umu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

Since 2008 the X-Ray Diffraction Facility (XRDF) operates at the Chemical Biology Center (KBC) and the Dept. of Chemistry, UmU (https://www.umu.se/en/research/infrastructure/x_ray_diffraction_facility/). It collaborates with the Protein Expertise Platform (PEP, UmU), a node of the Protein Production Sweden (PPS) National infrastructure for protein production.
Services provided: nano-drop robotic crystallization screens; optimization of crystal growth; screening of drug fragments and drug candidates by co-crystallization (in collaboration with CBCS Umeå/KI); cryo crystal preservation and storage in liquid nitrogen; in-house diffraction optimization (resolution and intensities); full cryo-diffraction data collection incl. data processing, 3D crystal structure determination, refinement and validation; deposition of coordinates with the Protein Data Bank (PDB) or the Cambridge Structural Database (CSD). Also, the XRDF can be used for powder and fiber diffraction. The XRDF offers user training for all local equipment.
In collaboration with the Umeå cryo-EM facility (UCEM, SciLifeLab), we provide access to microcrystal electron diffraction (microED) data collection. Further, the XRDF assists with synchrotron preparations, shipments and data collection (e.g. at MAX-IV, Lund), and with Neutron diffraction experiments at the European Spallation Source (ESS, Lund).
Equipment: mosquito robot (SPT LabTech), RockImager1000 (Formulatrix) for automated crystal imaging. Remote image access via a RockMaker Web interface. Fromulator (Formulatrix) liquid handling robot to optimize crystallization set-ups. A high brilliance X-ray source (X8 PROTEUM, Bruker AXS) for in-house data collection with a fine-focused, monochromatic X-ray beam at a wavelength λ = 1.54 Å (Cu- Kα radiation). A CryoStream 700 (Oxford) system to maintain the crystals at 100K during data collection. To our knowledge, this is the only active Swedish academic in-house protein X-ray equipment.

How is the facility providing infrastructure services today?

As a local core-facility, The XRDF is maintaining the crystallization and X-ray diffraction systems and carries out services upon user demand. So far, the XRDF provides the above mentioned services mainly to about 30 researchers associated with the Integrated Structural Biology network at Umeå university and SLU.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Estimated annual funding needed: 2.3 MSEK (see below)
1.5 MSEK (1.5 FTE)
0.3 MSEK (rent)
0.5 MSEK (consumables, service, running costs)

Uwe Sauer, Assoc. Prof., Umeå University
uwe.sauer@umu.se

Income:
Dept. of Chem.: 0.18 MSEK (0.2 FTE)

Rent, instrument running costs and consumables amounts to about 0.5 MSEK per year. Costs are covered mainly by user fees. Together with the equipment worth many millions in purchase value, this would represent the co-funding for a SciLifeLab-incorporated platform. In order to be able to offer national services within our current capabilities and to meet future needs (microED, MAX-IV and ESS), we would require 1.5 FTE, requiring 1.5 MSEK per year from Scielifelab.

Additional comment:

Two other PPS members, LP3 in Lund and PSF at KI, also have capabilities for crystallization and 3D structure determination. Together, we see opportunities to join forces when entering the SciLifeLab ISB platform and to together providing expertise and local direct access to protein crystallography environments.
The XRDF at Umeå Univ., with its unique X-Ray generator, will provide data collection opportunities in the North of Sweden, thus complementing MAX-IV.

Integrated Structural Biology

Proposals on New Technologies p. 140-163

Proposals on New Infrastructure Units p. 164-178

090: A national Adaptive Immune Receptor Repertoire Resource (AI3R)

Mats Ohlin, Professor, Lund University
mats.ohlin@immun.lth.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Leaders of relevant infrastructure units in Lund)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Integrated Structural Biology
Drug Discovery and Development
Bioinformatics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Context: Studies of adaptive immune receptors (AIR) (antibodies and T cell receptors) by high-end technologies enable understanding of the complexity and functionality of AIR responses for development of therapeutics, diagnostics, and bioanalysis. A diversity of genetic, protein and bioactivity data define AIR. The complexity and nature of AIR puts specific requirements on technologies, bioinformatics, and AI/ML in such studies, e.g. for our preparedness to swiftly respond through AIR solutions to novel pandemics.

Concept: The AI3R cross-platform initiative will use and develop existing competence and integrate infrastructures' capabilities specifically for studies of AIR.

AI3R vision: To be an integrated resources to promote AIR research.
AI3R mission: To enable high quality AIR research by a diversity of teams in Sweden.

AI3R will develop and guide research through integrated competences of existing local and national infrastructures, such as

• U-READ for antibody development / integration with SciLifeLab DDD capabilities,
• CTG/NGI to enable gene-based AIR research,
• BioMS to enable protein-based AB discovery,
• PPS for protein production,
• Structural Proteomics and Cryo-EM/LU to define AIR binding,
• The Lund University Virus Centre to provide functional AIR analysis in pandemic contexts,
• NBIS to enable AIR analysis through bioinformatic, AI and ML capabilities.

Impact: AI3R will enable AIR discovery to promote human health.

Estimated annual total funding (MSEK) needed from SciLifeLab:

3 M SEK for 2 FTE staff to be distributed across different existing national (e.g. NBIS, DDD, BioMS, Structural Proteomics, NGI, Cryo-EM) and local (e.g. U-READ, CTG, LU Virus Centre) infrastructure platforms to provide know-how for studies of AIR in a variety of experimental and analytical situations and to integrate different platforms, capabilities with a focus of AIR studies.

Additional comment:

None

091: Correlative live light superresolution microscopy plus cryo-electron tomography

Marta Carroni, PhD, Stockholm University
marta.carroni@scilifelab.se

***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher, Infrastructure

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

The field of structural biology has seen en explosion in the last 10 years with the rapid development of cryo-EM first and AlphaFold2. Even though it is easier to obtain information about the folding of specific proteins, it remains challenging to gather information about large protein assemblies, and even more, about their dynamics. It is then particularly interesting to learn about conformational changes in the cellular environment under varying physiological conditions. The structural biology world is developping into a phase of in-cell structural biology, where cryo-EM, cryo-ET, fluorescence light microscopy and in-cell NMR will all play a role. While several groups in the world are working in the field of correlative light and electron microscopy (CLEM) to identify specific events in the cell, very little is available in (i) correlation with superresolution light microscopy and (ii) correlation with live imaging in superresolution mode. These two modalities would make it possible to identify very precisely, with added information about the temporal dimension, cellular events while they are happening using superresolution imaging and then obtain near-atomic structural information by using cryo-EM/cryo-ET. At SciLifeLab CMI Solna, we have the uniquely combined knowledge in live superresolution microscopy and cryo-ET that would make it possible to develop a new correlative live superresolution cryo-EM technique. Instrumentation and dedicated personnel are needed.

Estimated annual total funding (MSEK) needed from SciLifeLab:

In the beginning, a first and simple initial set-up could be developed with ad hoc funding for instrumentation that needs to be combined in a unique way and with a dedicated person. For this first phase 1-2MSEK per year for 3 years could be enough considering co-funding. A second phase would imply the acquisition of very expensive instrumentation for milling of cellular specimen, capability not yet available in the cryo-EM node in Solna. This would imply a very large investment in the order of 40MSEK that should be co-funded by external funds as well as the universities interested.

Additional comment:

Cryo-EM is starting to undergo a new phase in the world and SciLifeLab needs to stay at pace with the rest of the world.

092: Cryo-CLEM (cryogenic correlative light and electron microscopy)

Alexander Mühleip, Dr, University of Glasgow
alexander.muhleip@glasgow.ac.uk

Integrated Structural Biology

***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

I do not know

Brief description of the technology:

Correlative Light and Electron Microscopy (cryo-CLEM), is an advanced imaging technique that combines the strengths of two different microscopy methods: fluorescent Light Microscopy (LM) and Electron Microscopy (EM), while maintaining the sample at cryogenic temperatures. The technique allows the biological samples such as vitrified tissues, cell or cell fractions to be imaged in near-native state. Particularly when studying rare events, using fluorescence microscopy to identify the area of interest for subsequent electron microscopic imaging is of great importance. Establishing cryo-CLEM at the SciLifeLab facility would act as a linker between existing fluorescence and cryo-EM facilities/platforms and allow users to analyse samples, for example before subsequent imaging by cryo-FIB-SEM in external facilities (KI, Umeå).

Estimated annual total funding (MSEK) needed from SciLifeLab:

N/A

Additional comment:

None

093: Cryo-EM

Kajsa Paulsson, PI, University, Industry, Experimental Medical Science
kajsa_m.paulsson@med.lu.se

Integrated Structural Biology
***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure coordinator FoM, LU + PI

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology

Is the technology currently available as local infrastructure service in Sweden?

Yes, Partly but the existing cryoEM needs to be complemented with tomography etc.

Brief description of the technology:

The existing cryoEM infrastructure, including CryoScreeNET is a fantastic asset for research in Sweden. CryoScreeNET has been working very well and I hope it will be potentiated and extended. The current services need be kept but at the same time adaptation to the international environment needs to be done. It will probably be necessary to very soon add capacity also for in situ structural biology and tomographic approach.

Estimated annual total funding (MSEK) needed from SciLifeLab:

1 MSEK

Additional comment:

None

094: Cryo-ET

Eva Maria Rebrova, Dr, Copenhagen University
eva.rebrova@cpr.ku.dk

Integrated Structural Biology

Representing:

A group of researchers (CPR Research Group - PI Nicholas Taylor)

The technology would fit in the SciLifeLab Platform(s):

Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology

Is the technology currently available as local infrastructure service in Sweden?

Yes, Stockholm and Umeå

Brief description of the technology:

in situ cryo electron tomography and techniques around it, tomogram processing and segmentation of thicker samples (bacterial cells)

Estimated annual total funding (MSEK) needed from SciLifeLab:

5MSEK in user support

Additional comment:

None

095: Cryo-FIB at SciLifeLab Solna

Hongyi Xu, Researcher, Stockholm University
hongyi.xu@mmk.su.se

Integrated Structural Biology
***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, SciLifeLab in Umeå (travelling with vitrified sample is difficult)

Brief description of the technology:

Sample preparation of lamellae of cells and micro crystals by cryo-FIB will greatly expand the capability of cryo-ET, MicroED and SerialED at SciLifeLab Solna.

Estimated annual total funding (MSEK) needed from SciLifeLab:

1 M SEK

Additional comment:

None

096: Cryo-FIB-SEM

Erin Schexnaydre, Research engineer, Umeå University
erin.schexnaydre@umu.se

Integrated Structural Biology

Representing:

Infrastructure

The technology would fit in the SciLifeLab Platform(s):

Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

An cryo-FIB instrument that is used solely for cryo work would greatly enhance the capacity of the cryo tomography projects at UCEM. It will allow for an automated approach to milling cryo lamella thus increasing the possible tomography data output in a given time frame. UCEM already works with a FIB-SEM that operates at both room temperature and cryo and therefore there would be minimal start up staff training for a new instrument. Also since the instrument would be used solely for cryo projects, it would increase the allotted time for these projects.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Roughly 10-15 MSEK

Additional comment:

None

097: Electron cryo-tomography set up which includes: cryo-FIB-SEM enabled with CLEM (eg, Aquilos 2 Cryo-FIB, the Thermo Scientific iFLM Correlative System); a high pressure freezer

Integrated Structural Biology

Vivek Singh, Dr., Karolinska Institutet
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***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher (Joanna Rorbach lab, Karolinska Institutet)

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

As cryo-ET allows us to visualize macromolecular complexes in situ, this is the next logical step and can provide breakthroughs beyond the limitations of single particle (SP) cryo-EM.
Joanna Rorbach's lab (where I am post-doc) works with human mitochondrial protein synthesis. Many clinically relevant complexes such as ribosome assembly intermediates or inner membrane-bound actively translating ribosomes cannot be purified from cells as they are too unstable in vitro. We will soon be looking at a potential exhaustion of information that can be practically extracted with traditional SP cryo-EM.
To study these processes in situ we to directly freeze cell/tissue samples or purified mitochondria. Simple vitrification that the existing set up allows may work for purified organelles but unlikely to work for cells/tissues which require high pressure freezing. Even purified mitochondria are too dense and require FIB milling capabilities. Further, complexes of interest can be quite sparse and thus region of interest hard to locate. We can tackle this with a high through-put set up aided by an integrated cryo-confocal imaging.
These facilities are only partly available at 3D-EM facility at KI, Biomedicum so that it is doable but with slow through-put due to an older set up.
This is one of the urgently needed facilities, as many elsewhere have already started to invest heavily in this.
Thankyou!

Estimated annual total funding (MSEK) needed from SciLifeLab:

about 40-70 MSEK to acquire and set up the facility

Additional comment:

None

098: Equipment for in-situ structural biology sample preparation

Integrated Structural Biology

Erik Lindahl, Professor, Stockholm University
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***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher, A group of researchers

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Precision Medicine
Planetary Biology
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Cryo-EM has been success story for the world in general, and SciLifeLab in particular. However, some of the strongest current trends worldwide are towards imaging proteins in more realistic conditions, in particular entire parts of tissue/cells.

There are several new research projects in the pipeline at Stockholm university (as well as other sites) targeting e.g. Quantitative Whole-cell Biology by combining tomography and MINFLUX with new computational models (collaboration with UIUC) as well as new proposals to determine structure and processes of the entire synaptic transmission, and not least understanding how membrane protein function is modulated both by other proteins and surrounding tissue. These studies are consistently published in some of the highest-impact journals in the world, and the groups involved are frequently ranked at the very top of the grading scale e.g. in VR and ERC.

However, realizing this requires access to equipment both for FIB-milling, possibly so-called lift-out techniques, and techniques to combine cryo-EM with light microscopy (e.g. CLEM). We are approaching this more from the user side, but I am confident e.g. Marta Carroni is aware of the next-generation equipment available.

While FIB-milling is available to some extent in the Umeå facility, the Stockholm facility has consistently provided higher throughput, higher availability, and better user training – and I believe it is warranted to have relevant equipment there too.

Estimated annual total funding (MSEK) needed from SciLifeLab:

I believe this would require a combined effort where SciLifeLab e.g. funds 2MSEK/year (?) and external agencies contribute major infrastructure investments.

Additional comment:

None

099: FIB-SEM (Focused ion beam scanning electron microscopy)

Integrated Structural Biology

Luca Jovine, Professor, Karolinska Institutet
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***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, Previous generation FIB-SEM systems exist at the Umeå node of SciLifeLab and the KI 3D-EM facility.

Brief description of the technology:

Since its establishment, the SciLifeLab cryo-EM facility in Stockholm has been arguably highly successful in enabling a large number of progressively more challenging single-particle projects. As a long time user, I believe that it would be a natural development for this facility to also acquire the ability to investigate by cryo-electron tomography and subtomogram averaging FIB-milled lamellae of cellular samples fixed by high-pressure freezing (HPF). The exciting type of studies enabled by these approaches are clearly where the future of structural biology lies, and having the option to also perform them at the Stockholm node of SciLifeLab would be of major value to all academic and industrial groups located in the Stockholm/Uppsala area and, more generally, the South of Sweden. In addition, it should be considered that the technologies underlying the HPF/cryo-FIB/ET pipeline are constantly being improved, and thus a de novo installation would allow Sweden to take advantage of the most recent developments and remain at the forefront of integrative structural biology.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Sorry, but I do not have this information. However, a clearly very important aspect is that the user fee should be kept within a reasonable range.

Additional comment:

As written above, to my knowledge there are two FIB-SEM systems available elsewhere in Sweden. However, because preparing samples for FIB-SEM remains highly challenging, physical proximity is often crucial, making it difficult for labs operating in the south of Sweden to take full advantage of the Umeå installation. The rapid technological developments in the field also make it highly desirable to obtain a latest generation system, beyond what is currently available in Umeå and at KI 3D-EM.

100: FIB-SEM, Cryo-CLEM

Rawan Shekhani, Mr, Karolinska Institutet
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Integrated Structural Biology

Representing:

An individual researcher, A group of researchers, Other

The technology would fit in the SciLifeLab Platform(s):

Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Cryo-electron tomography equipment, cryo-CLEM and FIB-SEM in Stockholm would be a great addition to national users. Advancements in Cryo-EM make the technique increasingly suitable for tomography, however, without equipment for localizing regions of interest (cryo-CLEM) and milling thin sections (FIB-SEM), its application is limited. That is why providing this equipment in a central node such as Stockholm will be of great benefit to the community and help with realization of many exciting project ideas that are currently not possible to do.

Estimated annual total funding (MSEK) needed from SciLifeLab:

5-10 MSEK?

Additional comment:

I really think this would help the national facility and researchers a lot, as it is difficult to get funding through other sources for such equipment

101: Intact mass analysis of proteins by MALDI-TOF mass spectrometry

Integrated Structural Biology

Malin Bäckström, PhD, head of unit, University of Gothenburg
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Representing:

A group of researchers (Carina Sihlbom, GU and Opher Gileadi, KI.)

The technology would fit in the SciLifeLab Platform(s):

Integrated Structural Biology

The suggested technology would contribute to following capabilities:

I do not know

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Many proteins undergo post-translational modifications that are important for their functions. When expressing recombinant proteins, it is important to determine the presence of such modifications. Intact mass measurements by mass spectrometry gives unique information that is quite difficult to get from tryptic digests of the proteins, including proteolysis at the ends, the structure of the N-terminus, overall phosphorylation levels, other PTMs, biotinylation and covalent binders. Intact mass MS gives additional information to MS of tryptic peptides, which is commonly used to verify protein identity and phospho- och glycosite mapping. Intact mass MS is also a key tool for analysis of protein conformation by partial proteolysis, and can also be used for native MS, identifying the stochiometry, composition and PTM of complexes. Researchers working with recombinant proteins, including but not limited to the proteins produced by Protein Production Sweden, are in the need of this information but this is today lacking as a service in Sweden. We propose to purchase an instrument, that could be run by the Proteomics Core Facility at the University of Gothenburg and to establish a service for all the users of Protein Production Sweden, including those from biotech companies, as well as for other protein researchers who need this powerful analysis.

Estimated annual total funding (MSEK) needed from SciLifeLab:

5 MSEK for MS-instrument, eg. Bruker autoflex LRF MALDI-TOF
Co-finance for MS instrument: 2.5 MSEK

Staff: (1x50%) 500 tSEK/yr
Premises: 70 tSEK/yr
Instrument cost incl service: 200 tSEK/yr
Running cost: 500 tSEK/yr

Total yearly cost: 1270 tSEK/ Yr

User fees: 260 tSEK/yr
Co-finance: 260 tSEK/yr

Applied funding SciLifeLab: 2.5 MSEK for MS instrument + 750 tSEK/yr

Additional comment:

The establishment of intact mass MS would benefit all researchers who need to characterize proteins, including both academic researchers and those from biotech companies. It would also benefit all researchers who use Protein Production Sweden to produce recombinant proteins for their research (around 100 researchers each year).

102: Isolation and Characterization of Extracellular Vesicles

Integrated Structural Biology

Maria Smedh, Site Coordinator, University of Gothenburg
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***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers, Infrastructure (SciLifeLab Gothenburg & the local Core Facilities)

The technology would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology
Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Extracellular vesicles (EVs) are small nano-sized vesicles released by all cells. EVs have been shown to play a major role in both health and disease such as homeostasis, cancer, inflammation, and neurodegenerative diseases. Importantly, in recent years their value to be used as therapeutics, biomarkers and vaccine has been highlighted and they have been extensively used in clinical trials. Publications have grown exponentially during the last years (over 6000 articles published during 2022) and there is now an increasing, unmet need from Swedish researchers to receive infrastructural support with high-quality isolation and characterization of EVs. Due to their nano-size, instruments built for cell analysis cannot be used and advanced instrumentation is needed for both isolation and characterisation of EVs. These instruments are usually expensive and requires specific competence. Here we present a close collaboration between the world leading research group within the EV field, led by Prof. Jan Lötvall, and the Core Facilities in Gothenburg including the SciLifeLab units Proteomics Core Facility and Centre for Cellular Imaging. Our aim is to provide the Swedish research community with the opportunity to isolate EVs followed by characterization with electron microscopy and/or ultrasensitive MS-based protein and RNA profiling as new world-leading capabilities within the SciLifeLab portfolio.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Personell: (2 x 40%) 850 tSEK
Premises: 70 tSEK (4500 SEK/ M2/Yr)
Instrument cost incl service: 400 tSEK
Running cost: 80 tSEK

Total cost: 1400 tSEK/ Yr

User fees: 400 tSEK
Co-finans: 250 tSEK

Applied funding SciLifeLab 750 tSEK/yr

Additional comment:

This service is decided to be implemented within the local Core Facilities infrastructure. It will be set up during the autumn and be operational at the end of the year.

103: LU-Fold

Lars-Anders Carlson, Dr., Umeå University
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Integrated Structural Biology
***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (My reasearch group)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, LU-fold at Lund University

Brief description of the technology:

My group has the need to do large-scale structure predictions, in particular to use the so-called alphafold-pulldown methodology to identify interactions between biochemically intractable viral proteins and host proteins. We have discussed a collaboration with Gemmar Atkinson at Lund, and my udnerstanding is that her group is at the forefront of adapting this methods to larger scale (entire proteomes or subsets of proteomes). It is my understanding that Dr. Atkinson currently has funding from Lund mainly to provide this service to local research groups. It would be of massive advantage to Sweden as whole to make this service available to the entire life science community.

Estimated annual total funding (MSEK) needed from SciLifeLab:

don't know

Additional comment:

None

104: Mass photometry for the Cryo-EM facility at Uppsala university, a node in the national cryo-EM network

Integrated Structural Biology

Anna Sundborger, Lektor, Uppsala University
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Representing:

A group of researchers, Infrastructure (Cryo-EM Uppsala and the Structural Biology program)

The technology would fit in the SciLifeLab Platform(s):

Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Mass photometry provides users with quick and cheap (using very small sample volumes) insight into protein size, stoichiometry and stability, a KEY step in the cryo-EM single particle analysis workflow not easiliy attained by other methods.

As a node in the national cryo-EM network, Cryo-EM Uppsala provides local and national users with the ability to screen and optimize samples before high-resolution data collection at microscopes in Stockholm and Umea. It is imperative that researchers have access to this instrument at the screening and optimization step, and thus, can access it locally (rather than at the national facility sites) since sample preparation occurs locally.

Estimated annual total funding (MSEK) needed from SciLifeLab:

The instrument is 2 MSEK to aquire and will require annual funding for service constract and technical support. Ideally, it would be staffed by cryo-EM Uppsala staff.

Additional comment:

None

105: Mass photometer

Cecilia Blikstad, PhD, Uppsala University
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Integrated Structural Biology

Representing:

A group of researchers

The technology would fit in the SciLifeLab Platform(s):

Integrated Structural Biology

The suggested technology would contribute to following capabilities:

I do not know

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Places equipped to do cryo-EM screening would be a lot more efficient if they also had a mass photometer

Estimated annual total funding (MSEK) needed from SciLifeLab:

Buying cost

Additional comment:

None

106: Mass photometry

Guillaume Gaullier, PhD, Uppsala University
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Integrated Structural Biology
***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher

The technology would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology
Integrated Structural Biology
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

I do not know

Is the technology currently available as local infrastructure service in Sweden?

I do not know

Brief description of the technology:

Mass photometry (MP) is a recently developed biophysical technique, now commercialized by the company Refeyn: https://www.refeyn.com

MP enables label-free, in-solution measurement of the molecular weight of biomolecular complexes from 30 kDa to 5 MDa, quick to perform (one measurement takes a few minutes). As a single-molecule method, it is more versatile than SEC-MALS or DLS: it does not need separation of biomolecules and provides information on all species in solution, allowing to assess purity, heterogeneity, stability and stoichiometry. Most importantly, it has much lower sample requirements, allowing its use for even the samples most difficult to prepare. Its broad applicability makes it useful to all biochemists, in academia and beyond.

Easy access to MP for researchers in Sweden would highly strengthen the Integrated Structural Biology unit.
A common issue in single-particle cryoEM is dissociation of a complex upon vitrification: MP would allow rapid screening of conditions that stabilize a complex, and optimize the use of screening microscopes (a bottleneck in cryoEM).
With recent advances in image analysis, cryoEM can study heterogeneous mixtures, but this remains challenging. Knowing how many species are present and their molecular weights from MP would greatly help such analyses, allowing researchers to address more difficult projects (for instance, purification from native sources instead of in vitro reconstitution from recombinantly produced components).

Estimated annual total funding (MSEK) needed from SciLifeLab:

The price range of one instrument is maybe 1 to 2 MSEK (not sure, impossible to find out without requesting a quote).
Ideally, there should be 3 or 4 instruments in infrastructure units, distributed across Sweden (Umeå, Uppsala, Stockholm, Gothenburg, Lund, for example).
This technology is very easy to use, so it would require less than a full-time person per instrument to train users, who could then measure in autonomy.

Additional comment:

None

107: Plasma FIB

Lars-Anders Carlson, Dr., Umeå University
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Integrated Structural Biology
***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher (In this case: my research group)

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

With the establishment of the national cryo-EM facilities in 2017, the Umeå node got one so-called FIB/SEM microscope. At that point, this was an "exotic" instrument used by a few groups for focussed ion-beam (FIB) milling, a novel sample preparation method for in situ cryo-electron tomography (cryo-ET). Since then, the interest in using this instrument has exploded, both for cryo-ET sample preparation, as well as for so-called volume imaging of resin-embedded cells and tissues.

While single-particle cryo-EM data collection capacity has increased massively at SciLife lab since 2017, the FIB milling capacity has not. The limited capacity has become a bottleneck to high-end in situ structural biology in Sweden. From the perspective of my own group, we are not currently able to do the kind of projects that we could do in 2017-2020, due to limited FIB/SEM access.

I propose to expand the cryo-EM platform with a new FIB/SEM instrument. Recently, a new generation of such instruments has been introduced to biological use. They are so-called "plasma-FIBs". This kind of instrument can in principle do the same things as the current FIB/SEM in Umeå. But their plasma beam is more powerful, allowing faster sample preparation and imaging of larger volumes. A plasma FIB operating alongside the current FIB/SEM instrument ("Scios") in Umeå would be an ideal combination, providing new capabilities at the cutting edge of cryo-EM.

Estimated annual total funding (MSEK) needed from SciLifeLab:

I am not sure, but here is an "order of magnitude" type of guess:

A service contract for this instrument is perhaps on the order of 0.3-1 MSEK/year.

I would defer to the cryo-EM platform if additional staff would be needed.

Of course, the up-front cost for instrument purchase is substantial. A ballpark guess is that a plasma FIB would cost on the order 20 MSEK. Note that the Umeå cryo-EM node (UCEM) has in the past been successful in securing instrument purchase funding from several sources including Wallenberg, Kempe foundations, VR and SciLife.

Additional comment:

For full disclosure: while I have written this from the point of view of my own research needs, I also have another role as the chair of the steering group of the Umeå Centre for Electron Microscopy (UCEM).

108: Plasma FIB

Thanat Chookajorn, Dr., Umeå University
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Integrated Structural Biology
***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (The malaria research community at Umeå University)

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

I do not know

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

We propose Focused Ion Beam Scanning Electron Microscope (FIB-SEM), especially with the latest technology of Plasma FIB which allows faster and more productive structural-determining capacities. Conventionally, FIB-SEM captures volumetric cell components, detailing 3-D organellar ultrastructures. It has become a new powerful tool in generating lamellae (<300 nm cryo-section) for electron tomography. The data can be resolved by subtomogram averaging (STA) to obtain near-atomic resolution macromolecular structures. Currently, novel workflows have been developed to solve proteins structures with the best use case capable of showing a small molecule fitting into a large protein complex.
The standard FIB-SEM relies on Gallium which limits bulk milling and inadvertently becomes a productivity bottleneck. The new technology exploits plasma as a milling tool and successfully creates suitable tomograms for protein structure determination with larger volume and at faster rate. Plasma FIB currently does not exist in Sweden.
The malaria research community is using FIB-SEM and STA to solve structures of unknown organelles and macromolecular complexes with success. For example, a crystalloid organelle which is needed for malaria transmission was delineated by these approaches, correcting a 50-year old misconception and creating new malaria intervention strategies. Explorations in more mechanisms are limited by the availability of only one Gallium-based Scios FIB-SEM currently in use.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Not available.

Additional comment:

I write this proposal on behalf of the malaria team at Umeå University. The rise in the structural determination technology using STA has made the Scios FIB-SEM at the SciLifeLab UCEM extremely busy. One often needs to wait a few months for booking. The long operating time with few samples per session has significantly delayed research progress. Getting a new FIB-SEM is imperative, and the latest Plasma FIB technology would solve the throughput bottleneck of the Gallium FIB equipment.

109: Plasma focused ion beam (FIB) scanning electron microscopy (-SEM) and additional volume imaging scanning instrument (e.g micro-CT)

Integrated Structural Biology

Linda Sandblad, Facility Director, Researcher, PI, Umeå University
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***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure

The technology would fit in the SciLifeLab Platform(s):

Spatial Biology
Cellular and Molecular Imaging
Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Planetary Biology
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Focused Ion Beam (FIB) Scanning Electron Microscopy (-SEM) for cellular volume imaging is an emerging methods, high demand from experienced Cryo-EM user groups, molecular and cell biologists in all fields; marine biology, plant science to medicine! Current FIB-SEM instrument (only) one at Umeå University is heavily used for all application, to continue to stay at the forefront of technology development facility and facility users would like to upgrade the Swedish facility with a new Plasma FIB-SEM, operating under ideal cryo-conditions, fast, for cryo-lamella, volume sections from cells and tissue, preparation as main, focus application. And to fulfil further cell biology need, to image larger cellular volumes and cell-cell interactions FIB volume-scope will make the, today slow, FIB volume imaging data collection more accessable, produce larger volumes to study, infection and cel cel communication and will free time for other applications. To the family belongs a third micro-CT instrument (for non-destructuve volume imaging at low resolution, but for samples of 1 cubic mm dimension), which could map the large (compared to EM dimensions) cell and tissue volumes in 3D prior to FIB-SEM milling, which is high resolution of a small volume, around 1 cubic microM. for example to localize/trace a cancer cell in tissue.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Facility staff: 1 M SEK per year, service contracts: 0,5 M SEK per year. Facility premises and lab consumables 0,5 M SEK per year.

Additional comment:

Currently one FIB-SEM is available in Sweden for life science applications.
Investment for new instruments: Plasma FIB: 15-35 M SEK, FIB volume scope: 10M SEK, Micro-CT: 3M SEK (only estimation)

110: Plasma focused ion beam (Plasma-FIB)

Max Renner, Dr, Umeå University
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Integrated Structural Biology

Representing:

An individual researcher

The technology would fit in the SciLifeLab Platform(s):

Integrated Structural Biology

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Imaging of cells under native conditions using a cryo electron microscope (cryo-EM) provides unprecedented insight into biological systems and disease states. This technology allows us to directly observe the contents of cells at molecular resolutions. However, to apply cryo-EM to relevant cellular samples it is most often necessary to make these transparent to electrons through a process termed focused ion beam (FIB) milling. Currently, FIB-milling is a laborious, slow, and error prone process.

Recently, instruments (such as the Arctis P-FIB, TFS) have been developed which may constitute a game-changer in FIB milling. Instead of the traditional gallium beam, these utilize plasma generated via inductively coupled plasma ion sources. Such plasma-FIB (P-FIB) instruments constitute a dramatic increase in throughput and allow access to larger samples, such as tissues: high-pressure frozen samples can now be directly ablated at reasonable speeds and prepared for imaging, without the requirement of complicated and error-prone sample-handling strategies. In addition to these benefits, modern P-FIB instruments also possess improved electron optics and lower contamination rates than previous machines.

To the best of my knowledge, Sweden currently does not possess P-FIB capabilities for the life sciences. Incorporation of such an instrument into a exisiting SciLife facility would greatly enhance throughput, international competitiveness, and access to new and relevant samples.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Initial purchase: 35 MSEK
Yearly running costs: 1.5 - 2.0 MSEK

Additional comment:

None

111: PReSTO for integrated structural biology

Martin Moche, Senior Lab Manager, Karolinska Institutet
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Integrated Structural Biology
***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Protein Science Facility)

The technology would fit in the SciLifeLab Platform(s):

Integrated Structural Biology
Bioinformatics

The suggested technology would contribute to following capabilities:

I do not know

Is the technology currently available as local infrastructure service in Sweden?

Yes, PReSTO is available at NSC Tetralith/Berzelius, LUNARC Cosmos and the MAX IV cluster

Brief description of the technology:

The PReSTO project makes structural biology software available in the high-performance-compute (HPC) environments of the National Academic Infrastructure for Supercomputing in Sweden (NAISS) and local MAX IV cluster (www.nsc.liu.se/support/presto/index.html).
PReSTO started in 2013 as an outreach activity of the National Supercomputer Center (NSC) in Linköping, funded by MAX IV as a satellite from 2015 – 2018, and by the Swedish Research Council 2018-2022. Structural biology evolved by photon-counting detectors, fourth generation light sources and free electron lasers for room temperature time-resolved crystallography now requires programmable GPUs for data analysis. PReSTO make use of Thinlinc, Gitlab and Easybuild to create an optimal and unique user experience by many adaptations and patches to the PReSTO software like making forkxds and CryoSPARC aware of SLURM scheduling (Simple Linux Utility for Resource Management).
In 2022, a structural biology course organized by Lund University, the integrated structural biology course organized by InfraLife, and the MicroMAX summer school organized by MAX IV were all using PReSTO. NSC Berzelius, a new NVIDIA SuperPOD with 60 DGX-A100 compute nodes, is available for SciLifeLab cryo-EM data processing via PReSTO.

The PReSTO project connects SciLifeLab to MAX IV via NAISS and can be added to the Integrated Structural Biology (ISB) platform or to the National Bioinformatics Infrastructure Sweden (NBIS) platforms of SciLifeLab.

Estimated annual total funding (MSEK) needed from SciLifeLab:

PReSTO involves staff from NAISS, MAX IV, SciLifeLab cryo-EM, and the Swedish structural biology community and require 4 MSEK per year for 4 full-time equivalents (FTEs).
– 2 FTE at NSC
– 0.5 FTE for Serial Synchrotron X-ray crystallography (SSX)
– 0.5 FTE for cryo-Electron Microscopy (cryo-EM)
– 0.5 FTE for Nuclear Magnetic Resonance (NMR)
– 0.5 FTE for Macromolecular X-ray crystallography (MX)
Staff from NSC has a leading role in PReSTO by performing project management, making first installs at NSC Tetralith, NSC Berzelius, LUNARC Cosmos and the MAX IV cluster and managing the GitLab repository. Community staff assigned by NSC perform software updates, online documentation, software testing and training of fellow scientists. Small-Angle X-ray/Neutron Scattering people wanted.

Additional comment:

The NSC competence has been recognized when the KAW (Knut and Alice Wallenberg Foundation) granted funding for SuperPOD resource Berzelius to NSC in 2021, when the Swedish Universities replaced SNIC (Swedish National Infrastructure for Computing) with NAISS in 2022, and when the EuroHPC JU (European High Performance Computing Joint Undertaking) granted funds for NSC Arrhenius in 2023 (https://liu.se/nyhet/europeisk-superdator-hamnar-pa-liu). Commercial licenses for PReSTO use are discussed.

112: Second Order Nonlinear Imaging of Chiral Crystals (SONICC)

Martin Moche, Senior Lab Manager, Karolinska Institutet
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Representing:

Infrastructure (Protein Science Facility (PSF))

The technology would fit in the SciLifeLab Platform(s):

Integrated Structural Biology

The suggested technology would contribute to following capabilities:

I do not know

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Modern time-resolved X-ray crystallography happens in room temperature and involves X-ray diffraction measurements in combination with pulsed laser triggering of redox events or caged compounds to monitor protein dynamics and structure adaptions on the pico- to femtosecond timescale. Besides caged compounds, acoustically generated chemical reagent droplets can be splashed towards crystals mounted on chips to enable time-resolved studies of chemical bond formation and catalysis. On the femtosecond timescale “simultaneous” laser light triggering requires nanocrystals because in one femtosecond light travels 0.3 µm. Chemical triggering also benefits from nanocrystals to minimize diffusion times for reagents reaching each protein molecule.

Protein Science Facility (PSF) delivers needle-shaped microcrystals for micro-ED at SciLifeLab and wants to develop nanocrystals for Serial Synchrotron X-ray crystallography (SSX), X-ray Free Electron Lasers (XFEL) and Fixed Target Serial Synchrotron X-ray crystallography (FT-SSX).

We propose the addition of Second Order Nonlinear Imaging of Chiral Crystals (SONICC – https://rb.gy/2j0ed) for nanocrystal detection at PSF. The SONICC instrument can either be a standalone or integrated into one of the two RockImager1000 UV and visible light instruments available. SciLifeLab should have the capacity to deliver nanocrystals for SSX beamlines such as upcoming MicroMAX beamline at MAX IV and elsewhere.

Estimated annual total funding (MSEK) needed from SciLifeLab:

We propose a total investment of 9.2 MSEK distributed as

- 8 MSEK, SONICC integration into PSFs twenty-degree RockImager1000 system including two years of warranty.
- or 7 MSEK, SONICC standalone system including two years of warranty.
- 1.2 MSEK, two extra years of warranty on SONICC system

SONICC is a unique instrument that combines Second Harmonic Generation (SHG) probing crystallinity for chiral (protein) crystals, and Ultraviolet Two-Photon Excited Fluorescence (UV-TPEF) to eliminate false positives from chiral salt and small molecule crystals (PMID: 22101350). PSF hosts two, four- and twenty-degree, RockImager1000 systems, which cost 6.5 MSEK in 2019, suitable for SONICC integration – https://formulatrix.com/protein-crystallization-systems/sonicc-protein-crystal-detection/.

Additional comment:

Time resolved X-ray diffraction technologies are in rapid development at synchrotron and laser light sources across the world (https://indico.classe.cornell.edu/event/2248/overview). Sample and reagent delivery systems are in focus and Swedish researchers successfully evaluated an X-ray transparent flow cell that deliver microcrystals for light triggered time-resolved SSX studies at MAX IV while Diamond Light Source develop “crystal-on-a-chip” technologies.

113: Working chain for cancer related questions

Mischa Woisetschläger, Dr, Health care, Radiology department Linköping
mischa.woisetschlager@regionostergotland.se

Integrated Structural Biology
***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Group of diff specialties with cancer research)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Clinical Proteomics and Immunology
Integrated Structural Biology
Bioinformatics

The suggested technology would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

I do not know

Brief description of the technology:

We would love a working chain for the handling of cancerspecific projects with the integration of images, genetic, journal information with regards to big data handling, radiomics and AI.

Estimated annual total funding (MSEK) needed from SciLifeLab:

3 000 000 SEK

Additional comment:

None

114: CryoScreenNet

Maria Selmer, Professor, Uppsala University
maria.selmer@icm.uu.se

Integrated Structural Biology

Representing:

A group of researchers

The facility would fit in the SciLifeLab Platform(s):

Integrated Structural Biology

Facility location:

Several universities

Contact person for the facility:

Marta Carroni

Contact person email address:

marta.carroni@scilifelab.se

Current number of unique users annually:

I do not know

The suggested facility would contribute to following capabilities:

Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

The CryoScreeNet is very important to allow the Swedish community to in the best way take profit of the SciLifeLab cryo-EM facilities in Stockholm and Umeå. The local nodes would benefit from increased resources to allow training of more new cryo-EM users.

How is the facility providing infrastructure services today?

As a national facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

I do not know

Additional comment:

None

115: LU-Fold

Gemma Atkinson, Dr, Lund University
gemma.atkinson@med.lu.se

Integrated Structural Biology
***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher, A group of researchers, Infrastructure (LU Fold facility at Lund University, and my group)

The facility would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Cellular and Molecular Imaging
Integrated Structural Biology
Bioinformatics
I do not know

Facility location:

Lund University

Contact person for the facility:

Gemma Atkinson

Contact person email address:

gemma.atkinson@med.lu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

LU-Fold is a new Lund University-based facility for helping researchers predict protein structures of interest using the cutting-edge method AlphaFold2 (Nature Methods method of the year, 2021). LU-Fold specialises in high-throughput prediction of protein complexes to predict novel protein-protein interactions. For example, we can predict pairwise interactions of a protein of interest with all other proteins in a proteome to find new binding partners and molecular binding interfaces.

We run as a service, using national high performance computing infrastructure to make high-throughput structural predictions. Users do not have to have any previous bioinformatics or structural biology experience.

Our services include prediction of:
– pairwise binding interactions of a protein of interest with all other proteins in a proteome
– structures of all proteins in a proteome (for instance from a newly sequenced genome)
– higher order structures of larger complexes
– the effects of mutations and truncations on proteins

We also offer training through workshops, tutorials and online guides to help others make predictions, compare structures, visualise results and make publication-quality figures.

This novel service was urgently needed and is receiving significant interest. The facility officially starts in August 2023, and until then the Atkinson lab has been initiating pilot projects within the scope of local and national collaborations. So far we have been collaborating on projects that e.g. find interactions of virus proteins with the human proteome, predict oligomers of bacterial cell division proteins, discover binding partners of proteins associated with childhood cancer neuroblastoma, and predict interactions of proteins involved in neurological disorders. We have made connections with researchers at MAX IV, and the SciLifeLab Cryo-EM and Structural Proteomics units in Lund, who see ample opportunities for partnership and knowledge sharing.

How is the facility providing infrastructure services today?

As a local core-facility, Currently funded solely by Lund University

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

The major cost is salaries as we do not rely on very expensive local equipment and consumables. Currently we have one engineer serving Lund University alone. To offer the service nationally, we

Gemma Atkinson, Dr, Lund University
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would need at least one more staff member, plus at least a 20% director position. Overhead, rent and small running costs are additional budget expenses. As a rough estimate, the total cost of a (minimal) national LU-Fold facility would be between 3 and 3.5 million per year.

We predict it would take a SciLifeLab investment of at least around 1.5-2 million per year to make LU-Fold nationally available. This assumes LU-Fold funding from Lund University remains the same at around 1 million per year, plus some cost recovery with user fees (potentially around 600 000 per year).

Additional comment:

SciLifeLab support of LU-Fold would strategically benefit both entities. For LU-Fold, the additional investment would aid sustainability and ability to help more researchers. For SciLifeLab, with LU-Fold's connection to structural biology, proteomics, genetics, and bioinformatics, there is significant added value, with many opportunities for synergies and integration with other existing SciLifeLab platforms. Education and training activities could be integrated with the SciLifeLab Training hub.

116: Lund Protein Production Platform (LP3)

Wolfgang Knecht, Dr, Lund University
Wolfgang.Knecht@biol.lu.se

Integrated Structural Biology

Representing:

A group of researchers (I, Derek Logan and Maria Gourdon from LP3)

The facility would fit in the SciLifeLab Platform(s):

Integrated Structural Biology

Facility location:

Lund University

Contact person for the facility:

Wolfgang Knecht

Contact person email address:

Wolfgang.Knecht@biol.lu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

Lund Protein Production Platform (LP3, www.lu.se/pps) is a center of Lund University (LU) providing services and equipment in the areas of recombinant protein production, crystallization, biophysical characterization, and structure determination. LP3 acts as the LU node of the national research infrastructure Protein Production Sweden (PPS, www.gu.se/pps) and is part of the MAX IV X-ray aided fragment screening platform (FragMAX, https://www.maxiv.lu.se/fragmax/). The PPS unit of LP3 is already in the process of becoming associated to SciLifeLab Lund and LP3 works closely together with the new cryo-EM facility at LU, which is a node in SciLifeLab's CryoScreeNET. LP3 provides the labs and collaborates with the biological part of the Deuteration and Macromolecular Crystallization platform (DEMAX, https://europeanspallationsource.se/science-support-systems/demax) of the European Spallation Source (ESS).

We propose to incorporate the crystallization & structure determination part of LP3 into the SciLifeLab ISB platform to make protein crystallization & structure determination nationally available, in particular as a service to non-expert users.
LP3 provides crystallization, data collection at the BioMAX beamline and subsequent structure determination. LP3 operates as a user and service facility, meaning LP3 does provide access to crystallization equipment for experienced users and runs entire projects for non-experts.
Equipment includes Dragonfly and Mosquito, for optimization screens and crystallization set ups including lipid cubic phase for membrane proteins, plate hotels with automatic imaging systems and access to an Oryx8 for larger crystal growth.
LP3 has expertise in neutron macromolecular crystallography (NMX) that is unique within Sweden, and capabilities to grow the large crystals required. This will become important as a resource for first science at the NMX macromolecular diffractometer of ESS, one of the first instruments expected to become operational.

How is the facility providing infrastructure services today?

As a local core-facility, 23–30 PI (10 % external to LU) per year (2018-22) for crystallization, biophysical characterization, and structure determination. LP3 provides access to crystallization equipment for experienced users and runs structure determination projects for non-experts. LP3 administrates the Lund BioMAX BAG.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Currently, the crystallization and structure determination part of LP3 is staffed with 1.3 FTEs financed by Lund University and user fees. This equals 1.45 MSEK per year. Together with the equipment worth many millions in purchase value, this would represent the counter financing for an incorporated LP3 platform into ISB, also having synergies with DDD and CBCS. To provide national service and interaction with mentioned SciLifeLab platforms, we see the need for one

Wolfgang Knecht, Dr, Lund University
Wolfgang.Knecht@biol.lu.se

additional FTE. This FTE should be financed in a similar manner to LU does for its part, the equivalent of 1.1 MSEK per year should be achieved with 1 MSEK directly from SciLifeLab and 0.1 MSEK by user fees. Besides these salary costs, all consumables' costs and other running costs are reclaimed through user fees.

Additional comment:

Regional facilities LP3, PSF & XRDF (PEP) provide basic X-crystallography but also have specializations, e.g., expertise in neutron crystallography (LP3) or software (PSF). They see opportunities to work together and therefore suggest their incorporation as a distributed platform. This also ensures local presence and access in 3 Swedish research cluster regions. We also see synergies with DDD, CBCS and pandemic preparedness at SciLifeLab and as gateway unit to FragMAX (separate application).

117: Lund University Bioimaging Centre

Sebastian Wasserstrom, PhD, Lund University
sebastian.wasserstrom@med.lu.se

Integrated Structural Biology
***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Lund University Bioimaging Centre)

The facility would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Spatial Biology
Cellular and Molecular Imaging
Integrated Structural Biology

Facility location:

Lund University

Contact person for the facility:

Sebastian Wasserstrom

Contact person email address:

sebastian.wasserstrom@med.lu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

LBIC has strategically invested in light-sheet microscopy and optical clearing since 2019, acquiring two systems and adopting various clearing techniques, including a recent high-throughput commercial clearing system purchase.
Collaborations with other infrastructures and research groups with specialized microscopes further enhance LBIC's value. These include live pathogen and high-throughput imaging platforms. For instance, in partnership with the Centre for Translational Genomics, LBIC is preparing workflows for spatial transcriptomics and single-cell NGS using 10X Genomics Visium and Takara ICELL8 cx Single-Cell System, available from late 2023. LBIC is also collaborating with Lund University's Pontus Nordenfelt group and Cytely AB to implement data-driven microscopy. This innovative concept, developed by the Nordenfelt group, integrates data-independent and data-dependent steps, enhancing live-cell imaging, reducing bias, increasing reproducibility, aligning with the SciLifeLab & Wallenberg Nat. Data-Driven Life Science initiative. In June, LBIC and the Dep. Exp Med Sciences jointly procured a 120kV Transmission Electron Microscope and a 200kV Cryo Electron Microscope. This adds opportunities for ultra-high-resolution microscopy and correlative workflows at the medical faculty and integrates with the CryoScreeNET, facilitating preliminary experiments before imaging at the SciLifeLab Cryo-EM sites in Stockholm and Umeå. LBIC personnel will be trained to operate and support these systems.
Integrating the above described components into SciLifeLab's infrastructure services will expand LBIC's impact to a larger base of national medical researchers and would offer unique large sample light microscopy and data-driven microscopy workflows for researchers in southern Sweden. Leveraging its current position, LBIC is well-equipped to deliver services aligned with multiple SciLifeLab platforms, meeting diverse medical researchers' advanced requirements.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility, LBIC is an imaging resource available to preclinical and clinical research groups at Lund University, Region Skåne as well as external organizations and companies. LBIC hosts a large variety of advanced preclinical and clinical imaging equipment and techniques ranging from micro to macro.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Estimated annual funding needs is 1.5 MSEK to cover two 50% research positions.
Co-funding: LU Medical faculty and private funding and ALF (Region Skåne).
An estimated 25% of running costs will be covered by user fees.

Additional comment:

117: Lund University Bioimaging Centre (cont.)

Sebastian Wasserstrom, PhD, Lund University
sebastian.wasserstrom@med.lu.se

Integrated Structural Biology
***Please note that this proposal is also found under other platforms*

Established in 2008, Lund University Bioimaging Centre (LBIC) primarily specialized in in vivo imaging with a focus on open access and expert staff. Initially consisting of MRI and PET/SPECT platforms, LBIC added electron microscopy in 2010 and light microscopy in 2013. Presently, LBIC provides a broad imaging platform, data analysis, and visualization. Our goal is to integrate our cutting edge light microscopy, correlative and data-driven microscopy services into the SciLifeLab infrastructure.

118: Mammalian Protein Expression (MPE) core facility

Integrated Structural Biology

Malin Bäckström, PhD, head of unit, University of Gothenburg
malin.backstrom@gu.se

Representing:

Infrastructure

The facility would fit in the SciLifeLab Platform(s):

Integrated Structural Biology

Facility location:

University of Gothenburg

Contact person for the facility:

Malin Bäckström

Contact person email address:

malin.backstrom@gu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

1-10

Brief description of the facility:

The core facility Mammalian Protein Expression (MPE) in Gothenburg produces proteins and glycoproteins in mammalian cells. Many proteins in biological and biomedical systems are post-translationally modified by N- and/or O-glycosylations. To facilitate the study of effects of individual carbohydrate modifications, proteins produced with specific glycosylation patterns are needed. Such glycoproteins can be produced in several eukaryotic expressions systems, with mammalian cells giving the most relevant human-like glycosylations. CHO or HEK293 cells are often used for this purpose, and these cells can be made to express modified glyosylation machineries, by co-transfection or using CRISPS/Cas, to get a specific type of glycosylation on the proteins. MPE is already producing proteins with specific glycosylations and we now suggest to develop those capabilities further and that this service provided by MPE should be included as a SciLifeLab platform. The glycans on the produced proteins can be analyzed by the glycoproteomic mass spectrometry unit at the University of Gothenburg. The effects of the glycans on the proteins can then be studied by for example NMR and structural MS within the Integrated Structural Biology platform, as well as by additional techniques to establish their biological functions. The addition of glycoprotein production, in combination with the already existing glycoproteomic unit within SciLifeLab, will offer a more complete set of techniques for researchers elucidating the role of individual glycans in biological systems.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility, MPE is a local facility but is also part of the national infrastructure Protein Production Sweden, but the service described here is only partly covered by that VR grant.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Staff: (1×50%) 500 tSEK/yr
Premises: 70 tSEK/yr
Instrument cost incl service: 200 tSEK/yr
Running cost: 500 tSEK/yr

Total cost: 1270 tSEK/ Yr

User fees: 260 tSEK/yr
Co-finance: 260 tSEK/yr

Applied funding SciLifeLab: 750 tSEK/yr

Additional comment:

MPE is part of the national infrastructure Protein Production Sweden (PPS) where it produces proteins and glycoproteins in mammalian cells. Here, the focus is on the production of proteins with specific or designed glycosylations, which is not fully covered by the PPS grant. By combining this competence with the glycoproteomic unit in SciLIfeLab, we suggest creating a more complete service for glyco research that takes advantage of this combined knowledge and can be offered

118: Mammalian Protein Expression (MPE) core facility (cont.)

Malin Bäckström, PhD, head of unit, University of Gothenburg
malin.backstrom@gu.se

through SciLIfeLab.

119: ProLinC

Gunhild Maria Selander Sunnerhagen, professor, Linköping University
maria.sunnerhagen@liu.se

Integrated Structural Biology
***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher, A group of researchers, Infrastructure (The ProLinC Biophysics Infrastructure in MOSBRI.eu)

The facility would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology
Bioinformatics

Facility location:

Linköping University

Contact person for the facility:

Maria Sunnerhagen, Dean Derbyshire

Contact person email address:

maria.sunnerhagen@liu.se

Current number of unique users annually:

10-50, More than 50

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

The LiU core facility ProLinC (liu.se/en/research/prolinc) is the Swedish node in the Horizon-2020 Molecular-Scale Biophysics Infrastructure that includes 13 academic state-of-the-art core facilities across Europe (mosbri.eu/partners/). ProLinC is a stakeholder in the SciLifeLab Integrated Structural Biology platform (ISB), and its NMR resource form part of SwedNMR (VR-infra). ProLinC at LiU uniquely offers a dedicated user facility including staff scientist support, making it possible for SciLifeLab users to fully explore their protein/complex properties and refine conditions for downstream applications, as well as explore the nature and dynamics of its interactions. ProLinC holds a near-complete set of instrumentation for the biophysical analysis of proteins and their interactions, quality assessment of biologics, and high-end fluorescence microscopy including hyperspectral options. ProLinC actively sustains transnational access (TNA) through MOSBRI as well as joint research activities in protein/peptide molecular studies and its applications within cancer, regenerative medicine and neurodegenerative and infectious diseases. When needed, our research environment fulfils Biosafety requirements for prion research. The main added value provided by ProLinC rests in the joint facile access to complementary and advanced biophysical techniques and to competence in their use, which is much appreciated by both academics and industry. Within SciLifeLab ISB, ProLinC provides user training in complementary biophysical techniques for protein QC as well as functional investigations. ProLinC actively supports WCMM users and provides essential data for AI-based protein structure and docking in the DDLS program. ProLinC has received supported by VR, SFF and ILL in maturing biomedical projects for neutron analysis using advanced pre-analysis by biophysical tools, thereby facilitating access for Swedish biomedicine to X-ray and neutron as well as cryo-EM and NMR infrastructures.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility, As a European and local infrastructure facility in Biophysics, and as part of a national facility for NMR (SwedNMR, the ProLinC NMR part only).)

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Today, ProLinC user access is enabled by combined LiU support and LiU user fees (since 2018, lims.ifm.liu.se) to primarily serve users at LiU and in the national WCMM and DDLS research networks where LiU is engaged. During 2022-2025, European access to ProLinC is fully supported by MOSBRI.eu. Today, national and industry users have to pay full cost coverage since 50% of staff and running costs are co-funded by LiU. To offer nation-wide service at LiU-level service fees, an annual SciLifeLab co-funding at

1.2 MSEK/yr is needed for staff/head-of-unit support and extra maintenance and service costs. Integration of ProLinC in SciLifeLab will enhance its node synergies (below) and ensure a continued, funding-competitive Swedish Biophysics platform in upcoming EU infrastructure programs.

Additional comment:

SciLifeLab ISB and Protein Production Sweden (PPS, VR) have jointly identified the need for supported, national user access to ProLinC for advanced protein QC, to meet required sample quality for downstream analysis (X-ray/Neutron, cryo-EM, NMR and other) and upcoming publication standards (https://p4eu.org/protein-quality-standard-pqs/). Full integration of ProLinC in SciLifeLab will facilitate exploring novel synergies between SciLifeLab nodes and with DDLS and WCMM research platforms.

120: Protein Science Facility (PSF)

Tomas Nyman, PhD, Head of unit, Karolinska Institutet
tomas.nyman@ki.se

Representing:

Infrastructure (Protein Science Faciltiy, MBB dept.)

The facility would fit in the SciLifeLab Platform(s):

Integrated Structural Biology

Facility location:

Karolinska Institutet Solna, Biomedicum

Contact person for the facility:

Tomas Nyman

Contact person email address:

tomas.nyman@ki.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

Founded in 2012 Protein Science Facility (ki.se/psf) provides services within protein production, biophysical characterization, and 3D structure determination services by Macromolecular X-ray crystallography (MX). PSF is part of the national infrastructure Protein Production Sweden (gu.se/pps).

PSF offers a high-capacity crystallization infrastructure accessible to trained users and full service in crystallization, synchrotron data collection, and 3D structure determination. Proteins, often produced by PSF, are crystallization screened in 96-well format using Phoenix and Mosquito crystallization robots. Fully automated imaging of crystallization experiments is done at 4°C and 20°C by two RockImager1000 imaging robots (Formulatrix) equipped with visible and UV-light for crystal detection and the capacity of storing 1000 96-well plates each. Crystallizations are monitored on-site, or via RockMaker Web interface for remote control of additional visible and UV-light imaging. Crystals are identified by AI (MARCO). Optimization experiments are designed in RockMaker that generate Freedom Evo robot dispensing scripts in a fully integrated manner.

We propose to add the services of PSF-MX to the ISB platform of SciLifeLab. Also, PSF-MX can develop crystals for fragment screening at FragMAX (MAX IV) and XChem (Diamond) and is well positioned for Fragment Based Lead Discovery in collaboration with CBCS at Karolinska Institutet. We can also generate microcrystals for microED measurements at SciLifeLab Cryo-EM part of ISB and the upcoming MicroMAX beamline for time-resolved room temperature Serial Synchrotron X-ray crystallography (SSX).

PSF coordinate block applications groups (BAGs) involving fifteen Swedish research groups to enable joint experimental MX and Small-Angle-Xray Scattering (SAXS) measurements at MAX IV and Diamond Light Source. We also engage in PReSTO (www.nsc.liu.se/support/presto/) a high-performance-compute environment for Swedish structural biology.

How is the facility providing infrastructure services today?

As a national facility, PSF-MX counts around 30 users yearly, representing KI, KTH, SU, LU, LiU, UU and SLU, and offers crystal screening, optimization, shipping to synchrotron, data collection, structure refinement, and structure deposition in PDB. PSF-MX today counts 100+ paper acknowledgements, and 300+ PDB depositions.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Expenses
2.1 FTE 2.5 MSEK
Rent lab 0.5 MSEK
Instrument, consumables, other 0.7 MSEK

120: Protein Science Facility (PSF) (cont.)

Tomas Nyman, PhD, Head of unit, Karolinska Institutet
tomas.nyman@ki.se

Income
KI/PSF 1.9 MSEK
User fees 0.6 MSEK
SciLifeLab funding 1.2 MSEK

Today the MX part of PSF is staffed with 1.1 FTE, equaling 1.3 SEK per year. Rent, instrument running costs and consumables equals 1.2 MSEK per year. Current costs are covered by Karolinska Institutet, PSF, and user fees (0.5 MSEK per year). Together with the equipment worth many millions in purchase value, this would represent the co-funding for a SciLifeLab-incorporated platform. To provide national service within our current capabalities as well as to meet the projected need within microED, MicroMAX, FragMAX and XChem, we see the need for one additional FTE, requiring 1.2 MSEK per year from Scielifelab.

Additional comment:

A separate proposal concerns a SONICC instrument (Second Order Nonlinear Imaging of Chiral Crystals) for efficient detection of microcrystals (<1µm).

Two other PPS members, LP3 in Lund and PEP in Umeå, also contain capabilities for crystallization and 3D structure determination. We see opportunities to join forces when entering the SciLifeLab ISB platform together providing expertise and local direct access to protein crystallography environments.

121: Stockholm University Brain Imaging Centre (SUBIC)

Tunhe Zhou, PhD, Stockholm University
tunhe.zhou@su.se

Representing:

Infrastructure (Stockholm Univeristy Brain Imaging Centre (SUBIC))

The facility would fit in the SciLifeLab Platform(s):

Integrated Structural Biology

Facility location:

Svante Arrhenius väg 16A, 114 18 Stockholm

Contact person for the facility:

Rita Almeida

Contact person email address:

Rita.Almeida@su.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

SUBIC - Stockholm University Brain Imaging Centre is a multidisciplinary infrastructure dedicated to research on brain structure and function, as well as other fields benefiting from imaging microstructures.

SUBIC has a laboratory X-ray micro-tomography system: Zeiss Xradia Versa 520, which we believe can be integrated as part of the integrated microscopy technologies. Zeiss Xradia Versa 520 is one of the most advanced models of X-ray microscope. With user-friendly control software, automatic loading robot, and advanced microscopic system, our machine offers the best experience for researchers. It has been used to make non-destructive, high resolution 3D imaging of very different type of samples, from insect eyes to animal bones and fossils. We are a SU core facility, but we are open for all national and international users, both from universities and private companies. At present, we have not only users from SU, but also users from, for example, SU, KTH, KI, Cambridge University and University of Michigan.

How is the facility providing infrastructure services today?

As a local core-facility, Currently SUBIC is funded by SU and by user fee income.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

The user fee scheme for SUBIC's X-ray microscope is 1500/h, or 12500/day, or 200,000/year. We are funded by SU and user fee. SUBIC is a new facility, which opened in 2019. In 2021/22 the X-ray lab had an average user fee income of 0.6MSEK, which covers circa 25% of the costs. Our future goal aim is to approach 100% coverage with user fees. Having the X-ray laboratory integrated into SciLifeLab would make the equipment visible to more potential users.

Every year SUBIC offers SU researchers opportunities of free usage, namely Time Grant, to encourage piloting of new projects. If integrated to SciLifeLab as part of a national facility, SUBIC wishes to open Time Grant to all Sweden. In this case, we estimate 50 kSEK annual support to allow 4 non-SU researchers to pilot.

Additional comment:

As we request no funding right now, we would like to investigate the possibility to be integrated in SciLifeLab even earlier than 2025. If this is not possible, we would like to investigate the possibility of being listed as an external collaborator of SciLifeLab, so that our equipment would be visible to SciLifeLab users that might benefit from X-ray microscopy.

122: X-Ray Diffraction Facility

Uwe Sauer, Assoc. Prof., Umeå University
uwe.sauer@umu.se

Integrated Structural Biology
***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (X-Ray Diffraction Facility (XRDF), KBC UmU)

The facility would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology
Drug Discovery and Development
Bioinformatics

Facility location:

Chemical Biology Centre KBC & Dept. of Chemistry, Umeå Univ.

Contact person for the facility:

Dr. Uwe Sauer

Contact person email address:

uwe.sauer@umu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

Since 2008 the X-Ray Diffraction Facility (XRDF) operates at the Chemical Biology Center (KBC) and the Dept. of Chemistry, UmU (https://www.umu.se/en/research/infrastructure/x_ray_diffraction_facility/). It collaborates with the Protein Expertise Platform (PEP, UmU), a node of the Protein Production Sweden (PPS) National infrastructure for protein production.
Services provided: nano-drop robotic crystallization screens; optimization of crystal growth; screening of drug fragments and drug candidates by co-crystallization (in collaboration with CBCS Umeå/KI); cryo crystal preservation and storage in liquid nitrogen; in-house diffraction optimization (resolution and intensities); full cryo-diffraction data collection incl. data processing, 3D crystal structure determination, refinement and validation; deposition of coordinates with the Protein Data Bank (PDB) or the Cambridge Structural Database (CSD). Also, the XRDF can be used for powder and fiber diffraction. The XRDF offers user training for all local equipment.
In collaboration with the Umeå cryo-EM facility (UCEM, SciLifeLab), we provide access to microcrystal electron diffraction (microED) data collection. Further, the XRDF assists with synchrotron preparations, shipments and data collection (e.g. at MAX-IV, Lund), and with Neutron diffraction experiments at the European Spallation Source (ESS, Lund).
Equipment: mosquito robot (SPT LabTech), RockImager1000 (Formulatrix) for automated crystal imaging. Remote image access via a RockMaker Web interface. Fromulator (Formulatrix) liquid handling robot to optimize crystallization set-ups. A high brilliance X-ray source (X8 PROTEUM, Bruker AXS) for in-house data collection with a fine-focused, monochromatic X-ray beam at a wavelength λ = 1.54 Å (Cu- Kα radiation). A CryoStream 700 (Oxford) system to maintain the crystals at 100K during data collection. To our knowledge, this is the only active Swedish academic in-house protein X-ray equipment.

How is the facility providing infrastructure services today?

As a local core-facility, The XRDF is maintaining the crystallization and X-ray diffraction systems and carries out services upon user demand. So far, the XRDF provides the above mentioned services mainly to about 30 researchers associated with the Integrated Structural Biology network at Umeå university and SLU.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Estimated annual funding needed: 2.3 MSEK (see below)
1.5 MSEK (1.5 FTE)
0.3 MSEK (rent)
0.5 MSEK (consumables, service, running costs)

Uwe Sauer, Assoc. Prof., Umeå University
uwe.sauer@umu.se

Income:
Dept. of Chem.: 0.18 MSEK (0.2 FTE)

Rent, instrument running costs and consumables amounts to about 0.5 MSEK per year. Costs are covered mainly by user fees. Together with the equipment worth many millions in purchase value, this would represent the co-funding for a SciLifeLab-incorporated platform. In order to be able to offer national services within our current capabilities and to meet future needs (microED, MAX-IV and ESS), we would require 1.5 FTE, requiring 1.5 MSEK per year from Scielifelab.

Additional comment:

Two other PPS members, LP3 in Lund and PSF at KI, also have capabilities for crystallization and 3D structure determination. Together, we see opportunities to join forces when entering the SciLifeLab ISB platform and to together providing expertise and local direct access to protein crystallography environments.
The XRDF at Umeå Univ., with its unique X-Ray generator, will provide data collection opportunities in the North of Sweden, thus complementing MAX-IV.

Chemical Biology and Genome Engineering

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123: Computational Analytics Support Platform (CASP) – data analytics service for life science researchers

Chemical Biology and Genome Engineering

Hans Stenlund, Acting Head of Unit (PhD), Umeå University
hans.stenlund01@umu.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers, Infrastructure (Swedish Metabolomics Centre (SMC))

The technology would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology
Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Drug Discovery and Development
Bioinformatics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, Computational Analytics Support Platform (CASP), Umeå University

Brief description of the technology:

The ability to analyse and draw valid conclusions from complex data sets, generated by high-throughput technologies, has become a bottleneck for many life science researchers. The shortage of skills required to analyse this flood of data has been recognised on both a national and local level.

To help bridge this gap locally, CASP was launched in 2021 at Umeå University, to primarily support but also train life scientists in the analysis of experimental data. CASP has supported a constant flow of researchers, both locally and nationally, from primarily academic, but also industrial settings.

CASP provides a unique set of tools primarily within multivariate data analysis, but also as relevant, AI/deep learning, pathway analysis, univariate statistics and statistical experimental design. These methods are applied to data from multiple technologies (e.g. metabolomics, proteomics, spectroscopy, imaging), contributing to CASP's diverse customer base from areas spanning disease diagnostics, infection biology, agriculture and environmental toxicology.

CASP also acts as a valuable extended support to the Swedish Metabolomics Centre (SMC), supporting users with the analysis and biological interpretation of data, both vital stages where users often require support and was previously difficult to find. CASP also supports the Vibrational Spectroscopy Core Facility and hopes to extend this to other SciLifeLab units i.e. Exposomics who have shown an interest in their service.

Estimated annual total funding (MSEK) needed from SciLifeLab:

CASP would require annual funding of 1 MSEK from SciLifeLab, to cover the salary costs of one member of staff dedicated to service.

Co-funding plans:
Support from Umeå University (including the Chemical Biological Centre):
2023-2024 – received 1.8 MSEK after being recognised as an infrastructure with potential to become of national interest
2025+ (estimate ~500 KSEK/year)

Future applications:
VR for research infrastructures of national interest (6 years funding (50% of total budget))
KAW – Proof of Concept Grant Program (2 years, 1-4 MSEK)

Income from user fees (estimate ~1 MSEK/year)
At present, user fees account for more than 50% of CASP's total revenue presenting CASP as a cost-efficient platform
Income from collaboration partners (estimate ~400 KSEK)

Additional comment:

Interdisciplinary expertise, domain expertise in both technology and life sciences, adds to the uniqueness of CASP, allowing support that goes

123: Computational Analytics Support Platform (CASP) – data analytics service for life science researchers (cont.)

Hans Stenlund, Acting Head of Unit (PhD), Umeå University
hans.stenlund01@umu.se

***Please note that this proposal is also found under other platforms*

beyond data analysis into the biological understanding of data. Their focus is on the analysis of biology readouts – phenotypic/non genomic data, making CASP complementary to bioinformatics support available at NBIS and the UPSC Bioinformatics Facility, who CASP hope to work alongside and together provide a strong support to the life science community.

124: Drug Repurposing Platform

Brinton Seashore-Ludlow, Senior Researcher, Karolinska Institutet
brinton.seashore-ludlow@ki.se

Representing:

An individual researcher, Infrastructure

The technology would fit in the SciLifeLab Platform(s):

Chemical Biology and Genome Engineering

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Drug repurposing (DR), where existing drugs are tested for therapeutic applications beyond their original indication(s), is a promising approach to address current unmet patient needs. DR's appeal lies in its cost-effectiveness, with development times and costs estimated to be 30%-75% lower than creating new drugs.
Growing European interest in DR is evident through recent Horizon Health Initiatives. EU consortia like REMEDi4ALL and REPO4EU strive to overcome current legislative and funding obstacles surrounding DR. To capitalize on these developments, we propose establishing drug repurposing services in Sweden. The proposed services would provide profiling of curated drug libraries in advanced disease models (e.g. primary patient cells, organoids, multi-cellular tumor spheroids) using high density assays (e.g. high content imaging), connecting disease characteristics with drug response. Projects supported by these services would be able to uncover the functional taxonomy of a disease, identify effective drugs for specific patient groups, and perform real-time, functional precision medicine studies. Large-scale drug sensitivity data in cell lines hosted by the Broad and Sanger Institutes provide invaluable public resources. Data generated from the proposed unit will be made FAIR, strengthening the data-driven life science initiative. Overall, the technologies, data integration and FAIR data will empower the drug repurposing and precision medicine communities in Sweden.

Estimated annual total funding (MSEK) needed from SciLifeLab:

The effort would need funding for a head of unit, a laboratory staff scientist and a bioinformatician to establish the service (Personnel: ca 3.5M SEK per year). Laboratory equipment is largely overlapping with the needs of the Chemical Biology Consortium Sweden, including high-content, high-throughput microscope, a screening hub, as well as compound storage, plating and distribution. This provides an excellent starting point for synergy and collaboration between the two units. Data storage e.g. server space for images (raw data and for data sharing) and an analysis computer would be needed as well (estimated at ca 300,000 SEK).

Additional comment:

The proposed service is complementary to existing SciLifeLab services from CBCS and the DDD platform. Here, the aim is to profile curated drug libraries across many disease representative models or cells from many patients. Projects at CBCS focus on screening a single disease model across larger small molecule collections, while DDD develops new chemical entities. Thus, the anticipated projects would need specialized analysis and support that currently fall outside DDDP and CBCS's portfolio.

125: ImageXpress Confocal HT.ai

Marianna Tampere, PhD, Karolinska Institutet
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Chemical Biology and Genome Engineering

Representing:

A group of researchers, Infrastructure (BSL3 Biomedicum Core Facility, KI)

The technology would fit in the SciLifeLab Platform(s):

Chemical Biology and Genome Engineering

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

ImageXpress Confocal HT.ai is a high-throughput, high-content imaging system with confocal resolution, live cell and machine learning capabilities. We propose to equip BSL-3 facility at KI Biomedicum who supports SciLifeLab researchers with risk group 3 (RG3) pathogens with HT.ai. BSL3 Biomedicum facility is the leader of Swedish BSL3 Network and has an vision to mediate the imaging system access to all Swedish researchers by Network activities.
The system is equipped with 7 lasers and has 8 imaging channels. It captures live or fixed cells in 2D or 3D format up to 60x magnification. Simple user interface compared to traditional confocal microscope allows acquisition automation and a built-in analysis software excludes the need for deep expertise in image analysis - users can have quick access without elaborate training. The technology surpasses any other existing system in the market.
IX HT.ai is not available in any Swedish University and would be the first to allow 1) drug screening methods inside the BSL3 e.g phenomics by Cell Painting ; 2) studies with live cell or spheroid/organoid models infected with RG3 or RG2 pathogens (e.g. SARS-CoV-2, Mpox virus, M. tuberculosis, etc); 3) detailed spatio-temporal resolution of pathogen-host interactions (minutes to days).
HT.ai inside a BSL3 facility would augment CBCS-Solna existing capabilities on antiviral screening in BSL3 and via BSL3-CBCS collaboration enable access to private companies and all Swedish researchers.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Total cost of the instrument with necessary additions: € 497 448,00
1 year warranty. Yearly service contract fee after warranty period: € 33 000
The costs are based on quote from Molecular Devices with a creation date July 11th 2023.

Additional comment:

The closest capability to proposed instrument is currently present at Linköping University BSL3 laboratory. IncuCyte instrument that enables live cell imaging with phase-contrast and two fluorescent channels, but is lacking the high-content, high-resolution, confocal and multiplex parameters.

126: Programmable Medicines Foundry

Sten Linnarsson, Professor, prefekt, Karolinska Institutet
sten.linnarsson@ki.se

Chemical Biology and Genome Engineering
***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Department of medical biochemistry and biophysics)

The technology would fit in the SciLifeLab Platform(s):

Chemical Biology and Genome Engineering
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Gene editing, synthetic biology, single-cell biology and AI are all converging to a new paradigm of biomedical research. Programmable drugs based on synthetic DNA or RNA delivered using nanoparticle vectors will soon become the dominant class of medicines. They will democratize drug development by radically narrowing the gap between basic discovery and clinical trial.

The proposed new facility will help researchers rapidly develop in silico-designed DNA or RNA for cell type-specific delivery to selected organs, in vitro, in vivo and for clinical trials. It will offer three services:

The Discovery service will offer in vitro and in vivo multiplex screening of lipid nanoparticle formulations and nucleic acid vectors. Multiplex pooled libraries will be provided for users to screen their tissue of interest using single-cell readout for specificity.

The Development service will offer R&D-scale; production of individual LNP formulations, suitable for use in vitro and in animals, as well as advice in vector design.

The GMP Manufacturing service will offer early clinical-grade GMP production of validated LNP formulations and vectors, as well as advice and support for IND applications. The goal will be GMP production with less than three months turnaround, made possible by the fact that nucleic acid drugs have predictable pharmacological properties.

The Foundry will be transformational by enabling the rapid translation of preclinical findings to clinical trials.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Rough initial estimate based on other GMP facilities: 12 – 18 MSEK/year plus 5+5 MSEK additional startup investments year 1 and 2.

Additional comment:

Reagent costs, including GMP-grade lipids and RNA/DNA (which will be outsourced), and amortised cost of instruments, will be covered by user fees.

127: Tailored services for precision medicine to bridge the gap between bedside and bench

Kaska Koltowska, Associate Professor, Uppsala University
kaska.koltowska@igp.uu.se

Chemical Biology and Genome Engineering

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (I represent 20 research groups across Sweden)

The technology would fit in the SciLifeLab Platform(s):

Clinical Genomics
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, DanioReadout at Uppsala University has these services

Brief description of the technology:

DanioReadout is a ground-breaking service platform based at Uppsala University with a visionary goal to revolutionise precision medicine and bridge the gap in healthcare treatment development. DanioReadout is dedicated to developing unique, customer-tailored services to enable rapid and accurate disease modelling and therapy development.

The key to success lies in its utilisation of zebrafish as a versatile and cost-effective model system, with AI operated image analysis, high-through disease modelling, and drug screening. Unlike traditional murine studies, zebrafish offers a range of advantages, making it an ideal candidate for drug testing and estimation of systemic and toxicological effects. Compliant with the 3R principles, zebrafish embryos are not considered research animals reducing the use of higher-order animals in research.

The future success of DanioReadout is strongly routed in the impressive track record. So far over 50 Swedish and international research groups have used the platform's advanced services, resulting in 40 completed projects.

As we embark on the journey towards precision medicine, data driven science for innovative treatment solutions, DanioReadout stands as a guiding light of assurance. By unlocking the functional understanding of genetic discoveries at an unprecedented scale and cost-efficiency, this service platform embraces the future of healthcare and beckons a new era of transformative breakthroughs for patients and researchers alike.

Estimated annual total funding (MSEK) needed from SciLifeLab:

The estimated total annual funding required is between 2,5 MSEK to 3MEK depending on the level of income from the user fees (which could come up to 0.5 MSEK at the beginning and scale up over the years). To effectively run this service the team requires a project coordinator (100%), research assistant (100%), research assistant (50%), and image analyst (20%), to salary costs sum up to 1,7MSEK. The direct costs are 0,6MSEK and the local costs and indirect costs to 0,7MSEK.

Additional comment:

Under new organisational management, DanioReadout will be at the Department of Immunology, Genetics and Pathology (Medical Faculty, Uppsala University). The operational director will be Beata Filipek-Gorniok, to ensure the continuity of services and efficient project coordination. Kaska Koltowska will be a Scientific Director working together with the advisory board (Carolina Wählby (IT), Aristidis Moustakas (IMBIM), Joakim Holmdahl (CIV), Staffan Svärd (ICM), Johan Ledin (FOI))

128: CBCS-UU node

Jordi Carreras-Puigvert, Associate Professor, Uppsala University
jordi.carreras.puigvert@uu.se

Chemical Biology and Genome Engineering

Representing:

Infrastructure (Chemical Biology Consortium Sweden - UU node)

The facility would fit in the SciLifeLab Platform(s):

Chemical Biology and Genome Engineering

Facility location:

Uppsala university (BMC)

Contact person for the facility:

Jordi Carreras-Puigvert

Contact person email address:

jordi.carreras.puigvert@uu.se

Current number of unique users annually:

1-10

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

Background:
The CBCS-UU node is a Morphological profiling facility providing compound and disease model profiling for mode of action elucidation as a service to any Swedish researcher and industry.

CBCS-UU was incorporated to CBCS in a recent expansion upon VR infrastructure funding received by CBCS. As a consequence, CBCS expanded from KI and UmU to Göteborg, Linköping, Lund and Uppsala. Our group, Pharmaceutical Bioinformatics, was incorporated to CBCS as the Uppsala node.

Our expertise in morphological profiling, combining a unique laboratory automation infrastructure and e-infrastructure, with state of the art AI for experimental design and analysis, was key for our successful incorporation to CBCS.

Technology:
We use Cell Painting for morphological profiling. Cell Painting is a high-content imaging technology that uses six fluorescent dyes to capture eight cellular compartments (Bray MA et al. 2016), which can be used to extract both MoA and target information (Nyffeler J et al. 2020). Importantly, the generated cell-specific morphological profiles in response to different perturbations using Cell Painting can be run in high-throughput, and single-cell level, facilitating biological discoveries and aiding biology-driven hypothesis generation (Caicedo J et al. 2016).

Current activities:
Since our recent formation in 2022, our facility has provided morphological profiling services as well as consulting to over 10 group leaders, from UU, UmU and KI. The demand for our services is in constant increase.

Current team members:
Malin Jarvius: node coordinator
Ola Spjuth: scientific coordinator
Martin Johansson: researcher
Jordi Carreras-Puigvert: node head

Funding sources:
Our current funding is based on the VR infrastructure grant and user fees.

Use of new funding:
Increase capacity by expanding our team and covering running costs, to offer our services to a larger community of researchers and industry.

How is the facility providing infrastructure services today?

As a national facility, Any Swedish academic group as well as industry

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

We estimate that in order to carry out an expansion of our activities our facility would require the following funding:
– 1.5M SEK

Jordi Carreras-Puigvert, Associate Professor, Uppsala University
jordi.carreras.puigvert@uu.se

The use of the funding would be for:
– 1 FTE
– Use/purchase of instruments
– Consumables

The co-funding plan is 0.5M SEK

Additional comment:

Why our facility could contribute to SciLifeLab's capabilities and programs:
– Pandemic Laboratory Preparedness: we have demonstrated that morphological profiling can be used for efficient and rapid anti-viral drug discovery (Rietdijk J et al. BMC 2021)
– Precision Medicine: we are involved in collaborations in which morphological profiling will be used in patient material for cancer PM
– Data Driven Life Science: we generate billions of data points per experiment making them perfect for DDLS

129: Computational Analytics Support Platform (CASP)

Kate Bennett, Platform Manager (PhD), Umeå University
katie.bennett@umu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Computational Analytics Support Platform (CASP))

The facility would fit in the SciLifeLab Platform(s):

Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Clinical Proteomics and Immunology
Drug Discovery and Development
Bioinformatics

Facility location:

Umeå University

Contact person for the facility:

Dr Kate Bennett

Contact person email address:

katie.bennett@umu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

The Computational Analytics Support Platform (CASP) is a data analytics service at Umeå University that primarily supports, but also trains life scientists in the analysis of experimental data, helping researchers unravel complex chemical and biological systems.

Since the platform began in 2021, CASP has supported researchers locally and nationally from diverse research backgrounds including health and disease, environmental toxicology, pharmaceuticals, agriculture and infection biology. CASP also acts as a valuable support to the Swedish Metabolomics Centre, supporting users with both the analysis and biological interpretation of data.

Their focus is on the analysis of phenotypic/non-genomic data from a wide range of technologies including, but not limited to, downstream omics (metabolomics/proteomics), spectroscopy and imaging. CASP provides researchers with advanced data-driven tools and strategies primarily within multivariate data analysis, but also AI/deep learning, univariate statistics, pathway analysis and statistical experimental design.

The uniqueness of CASP arises from their interdisciplinary nature. Combined, the group have strong expertise in data-driven life science, not only understanding statistics and modelling, but have wide domain knowledge arising from active engagement in numerous projects particularly in the ‘omics’ area and beyond. This allows for a full understanding of the researcher’s needs, not only in terms of the data analysis, but also in how the data was generated and equally important, the interpretation of the biology behind the project. Support can be provided from day one starting with experimental design, quality control of generated data, basic to in-depth data analysis, through to interpretation of results and publishing.

CASP’s mission is to help bridge the existing gap in data-driven life science by continuing to provide a valuable and much needed support to the life science community in Umeå and beyond.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility, Providing services to researchers primarily from Umeå University and other Swedish Universities.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

CASP would require annual funding of 1 MSEK from SciLifeLab, to cover the salary costs of one

Kate Bennett, Platform Manager (PhD), Umeå University
katie.bennett@umu.se

***Please note that this proposal is also found under other platforms*

member of staff dedicated to service.

Co-funding plans:

Support from Umeå University (including the Chemical Biological Centre):
2023-2024 – received 1.8 MSEK after being recognised as an infrastructure with potential to become of national interest
2025+ (estimate ~500 KSEK/year)

Future applications:
VR for research infrastructures of national interest (6 years funding (50% of total budget))
KAW – Proof of Concept Grant Program (2 years, 1-4 MSEK)

Income from user fees (estimate ~1 MSEK/year)
At present, user fees account for more than 50% of CASP's total revenue presenting CASP as a cost-efficient platform
Income from collaboration partners (estimate ~400 KSEK)

Additional comment:

CASP aims to provide researchers with services and expertise complementary to those offered by existing bioinformatics support platforms including the SciLifeLab Platform NBIS. Together, CASP aims to contribute to a stimulating work environment within the DDLS Data area node, which will be hosted at UmU, with CASP fitting perfectly in to three of the strategic DDLS research areas; Epidemiology and Biology of Infection, Cell and Molecular Biology and Precision Medicine and Diagnostics.

130: DanioReadout

Beata Filipek-Gorniok, PhD, Uppsala University
beata.filipek.gorniok@ebc.uu.se

Chemical Biology and Genome Engineering
***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (DanioReadout service facility (former GEZ))

The facility would fit in the SciLifeLab Platform(s):

Clinical Genomics
Chemical Biology and Genome Engineering
Drug Discovery and Development

Facility location:

Uppsala University

Contact person for the facility:

Beata Filipek-Gorniok

Contact person email address:

beata.filipek.gorniok@ebc.uu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

https://www.youtube.com/watch?v=6j0fGAiP9ao&t;=10s
DanioReadout (former Genome Engineering Zebrafish, Uppsala University based SciLifeLab National Facility) has, since 2016, served more than 50 Swedish and international research groups. Facility services included advanced services for disease modeling and project management as well as zebrafish husbandry and publication support resulting in more than 40 scientific publications. GEZ and DanioReadout are organizing world standard seminar series, workshops and conferences to educate researchers and students and raising interest and awareness of the zebrafish model's advantages and disadvantages.

How is the facility providing infrastructure services today?

As a local core-facility, Curently, DanioReadout is focusing on the development of the cancer modeling in zebrafish embryo for the Uppsala based research groups.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

The estimated annual funding required for the DanioReadout is between 2,5 MSEK to 3MEK. The potential future user fees are estimated to be around 0.25-0.7MSEK/year.
Currently DanioReadout is composed of 1.15 FTA and the funding structure is based on the user fees. Local Uppsala University SciLifeLab is currently working on establishing DanioRadout as a local facility. Several grant applications involving DanioReadout as an essential collaborator has been submitted.

Additional comment:

None

131: FragMAX platform

Tobias Krojer, Dr, Lund University
tobias.krojer@maxiv.lu.se

Chemical Biology and Genome Engineering
***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (MAX IV Laboratory)

The facility would fit in the SciLifeLab Platform(s):

Chemical Biology and Genome Engineering
Drug Discovery and Development

Facility location:

MAX IV Laboratory

Contact person for the facility:

Tobias Krojer

Contact person email address:

tobias.krojer@maxiv.lu.se

Current number of unique users annually:

1-10

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

Fragment screening is an effective and low-cost method for identifying starting points for drug or tool compound development. MAX IV Laboratory's FragMAX facility provides crystallographic fragment screening at the BioMAX and MicroMAX beamlines. It can be accessed through biannual calls via the MAX IV user programme.
The platform, which has been in operation since 2020, is made up of four key components: (i) a crystal preparation facility, (ii) freely available fragment libraries, (iii) automated diffraction data collection at the BioMAX beamline, and (iv) a web application for large-scale data processing. The crystal preparation laboratory is hosted by the Lund Protein Production Platform (LP3) and uses shared protein crystallisation equipment. FragMAX was designed for fragment screening, but it can support all structure-based drug development projects that require rapid determination of many protein-ligand complex structures.
We propose a new, science-driven and FragMAX-enabled gateway for CBCS and DDD to MAXIV. If projects at CBCS and DDD require structural information to proceed, they will be able to directly access the platform. FragMAX staff will evaluate feasibility, design the project, execute the experimental steps and, if necessary, recommend the inclusion of other SciLifeLab infrastructures to provide suitable starting materials like purified protein. FragMAX can already support all steps from initial crystallisation trials to final crystal structures due to its co-location with LP3 and custom-made computational tools that accelerate the X-ray data processing and analysis part. Projects can be run concurrently and continuously, resulting in quick turnaround of results. By combining the technical capabilities of two major Swedish infrastructures and therefore enabling that projects are guided by scientific need and do not depend on user expertise, we will be generating new synergies for early stage drug discovery in Sweden.

How is the facility providing infrastructure services today?

As a national facility, FragMAX can be accessed by national and international users through the MAX IV user program

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

This proposal is built on an existing platform, so no investments are required. Additionally, its running costs are low. Academic users can use MAX IV free of charge. FragMAX is managed by a permanently employed beamline scientist (ca. 1.5 MSEK for salary p.a. provided by MAX IV). Furthermore, the platform is supported until the end of 2024 by an LP3 research engineer on a part-time basis. To serve as a new SciLifelab node, we need funding from SciLifeLab to maintain ongoing support from a research engineer and to fully fund the position so that comprehensive project support can be provided (1.2 MSEK for salary per year). We anticipate that consumables will require funding of 0.1 MSEK per year, but no user fees will be charged unless non-standard experiments are requested.

131: FragMAX platform (cont.)

Tobias Krojer, Dr, Lund University
tobias.krojer@maxiv.lu.se

Chemical Biology and Genome Engineering
***Please note that this proposal is also found under other platforms*

Additional comment:

The PPS unit, LP3, is preparing to join SciLifeLab Lund in order to provide extended protein crystallography support. Our proposal does not seek to compete with existing or new infrastructures, but rather serve as an node that facilitates usage of their unique capabilities to support structure-based drug discovery projects within SciLifeLab. In addition, FragMAX will continue to serve national and international users from academia and industry, through the MAX IV user program.

132: RNA modification MS

Carina Sihlbom Wallem, Head of unit, University of Gothenburg
carina.sihlbom@gu.se

Chemical Biology and Genome Engineering
***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure

The facility would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Chemical Biology and Genome Engineering
Clinical Proteomics and Immunology

Facility location:

University of Gothenburg

Contact person for the facility:

Carina Sihlbom Wallem

Contact person email address:

carina.sihlbom@gu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

Different chemical modifications play distinct regulatory roles in RNA function, eg. methyl6A influences RNA metabolism in stability, splicing, translation, localization and RNA secondary structure. Mass spectrometry (MS) is currently the only technique that can directly and comprehensively characterize and quantify chemical modifications in RNA sequences. Other methods require prior knowledge of the sequence information to target a single specific nucleotide and cannot quantify the modification status in a de novo manner or are dependent on radioactive or other reagents. The majority of RNA MS has previously focused on reducing the RNA to mono-nucleosides and applying workflows analogous to metabolite analysis. These techniques are effective in determining which modifications are present but all critical information about the location and co-occurrence of modifications is lost. Analysis of intact RNA oligonucleotides (5-15 nucleotide fragments) by tandem mass spectrometry (MS/MS) is capable of determining modification sites with single-nucleotide resolution. RNA samples are first digested by selective endoribonucleases and then separated via MS compatible ion-pair liquid chromatography (LC). The current approach of choice has been set up at the Proteomics Core Facility at University of Gothenburg. This LC-MS approach can provide both site, type and quantitative information for the RNA modifications of interest and is to our knowledge not earlier available in Sweden.

How is the facility providing infrastructure services today?

As a local core-facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

MS expert 30% 300 kSEK
Material/ Chemicals 50 kSEK
Service contracts MS instruments 50 kSEK

Co-funding from GU in terms of shared MS instrument, staff and lab space.

Additional comment:

None

133: U-PRINT

Johan Kreuger, Professor, Uppsala University
Johan.kreuger@mcb.uu.se

Representing:

Infrastructure (U-PRINT)

The facility would fit in the SciLifeLab Platform(s):

Chemical Biology and Genome Engineering

Facility location:

Uppsala University

Contact person for the facility:

Johan Kreuger

Contact person email address:

Johan.Kreuger@mcb.uu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Precision Medicine

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

3D printing, also known as additive manufacturing (AM), represents a transformative leap in the manufacturing domain. It not only accelerates prototyping but also introduces a wide range of new materials and paves the way for producing intricate and previously unattainable geometries that traditional manufacturing techniques couldn't achieve.
The use of AM to create novel methods and equipment, as well as tissues, has revolutionized life science research and innovation. For instance, advanced tools for basic cell and animal research, drug screening assays, diagnostic devices, biochemical assay equipment, 3D bioprinted tissue models, and personalized implants demonstrate the potential.
U-PRINT facilitates life science research and technology development via cutting-edge 3D printing and bioprinting services. By providing access to advanced equipment, experts in design for AM, and opportunities for interdisciplinary collaboration, the infrastructure empower life science researchers to effectively leverage AM and transform their innovative ideas into new excellent research, innovative methods, publications, and patents.
U-PRINT is a unique Swedish infrastructure supporting life science researchers with AM capabilities for a wide range of life science applications, including bioprinting. U-PRINT has an 8-year track record of supporting >200 researchers, innovators and 22 companies with >2000 print jobs and a transparent offering and price model. During 2022 we had 78 unique users. The majority of users (91%) are based in Uppsala, with 7% in Stockholm, and 1% each in Göteborg and Lund. This distribution clearly indicates an unmet national demand and potential for expansion.
With Prof. Mia Phillipson and Assistant Prof. Gry Hulsart-Billström we are expanding into advanced translational bioprinting. We co-founded the competence center AM4Life together with Prof. Cecilia Persson and collaborate with her team at AM@Å complementing U-PRINT and creating powerful synergies.

How is the facility providing infrastructure services today?

As a national facility, Currently, about 90 % of our users are based in Uppsala and 10 procent in other parts of Sweden. We also have some users outside Sweden in other parts of Europe.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

To expand and bolster the U-PRINT infrastructure, we deem it essential to establish nodes in various cities. We have recently launched the National Network for 3D Printing and Bioprinting for the Life Sciences to unite experts from Swedish universities.
A possible projected budget breakdown is as follows:
U-PRINT in Uppsala: 6 MSEK/year, with 50% (3 MSEK) financed by SciLifeLab.
Nodes in Lund, Göteborg, Stockholm, and Linköping: 2.5 MSEK/year, totaling 10 MSEK/year, 50% (5 MSEK) financed by SciLifeLab.
Total annual expense: 16 MSEK, with SciLifeLab

Johan Kreuger, Professor, Uppsala University
Johan.kreuger@mcb.uu.se

contributing 8 MSEK.
U-PRINT is currently backed by Uppsala Univ., SciLifeLab SFO, AM4Life, and ERUF-funds, with user fees (amount/year), these funds will serve as co-financing. Similarly, all host universities will provide co-funding.

Additional comment:

U-PRINT is currently in talks with the Chemical Biology Consortium Sweden (CBCS) infrastructure unit to explore how our facilities can complement the existing offerings on the CBGE platform. One avenue of interest is the potential application of our bioprinted constructs in high-throughput drug screening. Additionally, fluidic and culture systems can provide value for studying drug responses.

Drug Discovery and Development

Proposals on New Technologies p. 200-212

Proposals on New Infrastructure Units p. 213-221

134: A national Adaptive Immune Receptor Repertoire Resource (AI3R)

Drug Discovery and Development

Mats Ohlin, Professor, Lund University
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***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Leaders of relevant infrastructure units in Lund)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Integrated Structural Biology
Drug Discovery and Development
Bioinformatics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Context: Studies of adaptive immune receptors (AIR) (antibodies and T cell receptors) by high-end technologies enable understanding of the complexity and functionality of AIR responses for development of therapeutics, diagnostics, and bioanalysis. A diversity of genetic, protein and bioactivity data define AIR. The complexity and nature of AIR puts specific requirements on technologies, bioinformatics, and AI/ML in such studies, e.g. for our preparedness to swiftly respond through AIR solutions to novel pandemics.

Concept: The AI3R cross-platform initiative will use and develop existing competence and integrate infrastructures' capabilities specifically for studies of AIR.

AI3R vision: To be an integrated resources to promote AIR research.
AI3R mission: To enable high quality AIR research by a diversity of teams in Sweden.

AI3R will develop and guide research through integrated competences of existing local and national infrastructures, such as

• U-READ for antibody development / integration with SciLifeLab DDD capabilities,
• CTG/NGI to enable gene-based AIR research,
• BioMS to enable protein-based AB discovery,
• PPS for protein production,
• Structural Proteomics and Cryo-EM/LU to define AIR binding,
• The Lund University Virus Centre to provide functional AIR analysis in pandemic contexts,
• NBIS to enable AIR analysis through bioinformatic, AI and ML capabilities.

Impact: AI3R will enable AIR discovery to promote human health.

Estimated annual total funding (MSEK) needed from SciLifeLab:

3 M SEK for 2 FTE staff to be distributed across different existing national (e.g. NBIS, DDD, BioMS, Structural Proteomics, NGI, Cryo-EM) and local (e.g. U-READ, CTG, LU Virus Centre) infrastructure platforms to provide know-how for studies of AIR in a variety of experimental and analytical situations and to integrate different platforms, capabilities with a focus of AIR studies.

Additional comment:

None

135: Advanced Bioanalytics: Lipid Nanoparticle Development and Nanoparticle Characterization facility

Drug Discovery and Development

Fredrik Höök, Professor, Chalmers University of Technology
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Representing:

A group of researchers (Chalmers centre FoRmulaEx)

The technology would fit in the SciLifeLab Platform(s):

Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Advanced Therapy Medicinal Products (ATMP) utilizes advanced techniques such as gene therapy, cell therapy and tissue engineering. A key challenge relates to optimal delivery of genetic material with high efficiency and at reasonable cost. To do this “delivery vehicles” are needed and Lipid Nanoparticles (LNPs) are increasingly being used to accomplish this goal.

We have since the start in 2017 of the SSF funded industrial research centre FoRmulaEx with academic partners from Chalmers, GU and KI and the industrial partners AstraZeneca, Camurus, Vironova and Nanolyze reached the research frontline in the rapidly growing field of new methods and technologies for the design, production and characterization of LNPs and alternative carriers such as extracellular vesicles (EVs). These solutions will be crucial to the success and efficiency of many future ATMPs solutions.

The proposed Advanced Bioanalytics facility, that has emerged through infrastructure investments and innovations generated within FoRmulaEx, will support academic researchers, biotech, pharma as well as and startups companies. The plan is to co-locate the infrastructure at Chalmers and the Center for Contract Research and Manufacturing (CCRM) Nordic facility at GoCo Labs adjacent to AstraZeneca’s site in Mölndal. CCRM Nordic is planned to be opened in 2026 and in anticipation of that activities will take place at Chalmers and in provisional facilities at GoCo Health Innovation City.

Estimated annual total funding (MSEK) needed from SciLifeLab:

The facility needs a designated full-time lab manager, 2-4 technicians, plus marketing and legal support (6 MSEK/year).
The annual cost for depreciation of instrument is according to a market analysis conducted by Triathlon AB estimated to be around 4 MSEK.
Additional support is anticipated from Chalmers Univ, Chalmers foundation, and VGR. AstraZeneca also plans to co-localize essential equipment as well as personnel to GoCo Labs.
Academic and industrial users will be charged as eligible by national regulations.
A funding from SciLifeLab on the order of 3MSEK/year would significantly support these ongoing plans, and help making the facility broadly available as a national infrastructure.

Additional comment:

The market analysis conducted by Triathlon AB suggests that the number of unique users from academia and industry will be on the order of 20 to 40, with an expected annual growth of at least 20%. The proposed infrastructure complements the activities in Oligonova, putting focus on short oligos which has less requirements for advanced formulations. However, there is a clear synergy between Oligonova and Advanced Bioanalytics considering the need of state-of-the-art cellular imaging platforms.

136: AI-accelerated drug discovery

Jens Carlsson, Professor, Uppsala University
jens.carlsson.lab@gmail.com

Drug Discovery and Development

Representing:

An individual researcher (-)

The technology would fit in the SciLifeLab Platform(s):

Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Despite access to state-of-the-art experimental technologies at SciLifeLab and national facilities (e.g., high-throughput screening, DNA-encoded libraries, and fragment screening), academic drug discovery efforts in Sweden struggle to develop drug candidates. Screens of chemical libraries to find starting points for drug discovery are continuously being carried out at SciLifeLab platforms (CBCS, DDD, NMR centre), national research facilities (MAX IV), and research groups at Swedish universities. However, optimization of hits from these screens into lead candidates remains to be a major challenge and resource demanding. Recent advances in organic chemistry have provided access to billions of molecules, e.g. via make-on-demand synthesis and screens of DNA-encoded libraries. Screens of these enormous libraries result in large amounts of data, which provide the opportunity to utilize artificial intelligence and other data-driven methods. This approach has the potential to transform the early drug discovery process, but more resources are needed to introduce such techniques at the platforms. Complementing the available experimental technologies with the capability to utilize computational chemistry tools based on artificial intelligence will be crucial in the data driven life science era. SciLifeLab should recruit a cheminformatician that will guide medicinal chemistry efforts at the DDD (and CBCS) platforms and thereby accelerate the discovery of drug candidates.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Recruitment of a cheminformatician (1 FTE) would cost ca 1MSEK per year.

Additional comment:

I have been involved in a TDP that is connected to this proposal, providing a starting-point for initiation of the proposed capability.

137: Computational Analytics Support Platform (CASP) – data analytics service for life science researchers

Drug Discovery and Development

Hans Stenlund, Acting Head of Unit (PhD), Umeå University
hans.stenlund01@umu.se

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers, Infrastructure (Swedish Metabolomics Centre (SMC))

The technology would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology
Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Drug Discovery and Development
Bioinformatics

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, Computational Analytics Support Platform (CASP), Umeå University

Brief description of the technology:

The ability to analyse and draw valid conclusions from complex data sets, generated by high-throughput technologies, has become a bottleneck for many life science researchers. The shortage of skills required to analyse this flood of data has been recognised on both a national and local level.

To help bridge this gap locally, CASP was launched in 2021 at Umeå University, to primarily support but also train life scientists in the analysis of experimental data. CASP has supported a constant flow of researchers, both locally and nationally, from primarily academic, but also industrial settings.

CASP provides a unique set of tools primarily within multivariate data analysis, but also as relevant, AI/deep learning, pathway analysis, univariate statistics and statistical experimental design. These methods are applied to data from multiple technologies (e.g. metabolomics, proteomics, spectroscopy, imaging), contributing to CASP's diverse customer base from areas spanning disease diagnostics, infection biology, agriculture and environmental toxicology.

CASP also acts as a valuable extended support to the Swedish Metabolomics Centre (SMC), supporting users with the analysis and biological interpretation of data, both vital stages where users often require support and was previously difficult to find. CASP also supports the Vibrational Spectroscopy Core Facility and hopes to extend this to other SciLifeLab units i.e. Exposomics who have shown an interest in their service.

Estimated annual total funding (MSEK) needed from SciLifeLab:

CASP would require annual funding of 1 MSEK from SciLifeLab, to cover the salary costs of one member of staff dedicated to service.

Co-funding plans:
Support from Umeå University (including the Chemical Biological Centre):
2023-2024 – received 1.8 MSEK after being recognised as an infrastructure with potential to become of national interest
2025+ (estimate ~500 KSEK/year)

Future applications:
VR for research infrastructures of national interest (6 years funding (50% of total budget))
KAW – Proof of Concept Grant Program (2 years, 1-4 MSEK)

Income from user fees (estimate ~1 MSEK/year)
At present, user fees account for more than 50% of CASP's total revenue presenting CASP as a cost-efficient platform
Income from collaboration partners (estimate ~400 KSEK)

Additional comment:

Interdisciplinary expertise, domain expertise in both technology and life sciences, adds to the uniqueness of CASP, allowing support that goes

137: Computational Analytics Support Platform (CASP) – data analytics service for life science researchers (cont.)

Hans Stenlund, Acting Head of Unit (PhD), Umeå University
hans.stenlund01@umu.se

***Please note that this proposal is also found under other platforms*

beyond data analysis into the biological understanding of data. Their focus is on the analysis of biology readouts – phenotypic/non genomic data, making CASP complementary to bioinformatics support available at NBIS and the UPSC Bioinformatics Facility, who CASP hope to work alongside and together provide a strong support to the life science community.

138: Cryo-FIB at SciLifeLab Solna

Hongyi Xu, Researcher, Stockholm University
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Drug Discovery and Development
***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, SciLifeLab in Umeå (travelling with vitrified sample is difficult)

Brief description of the technology:

Sample preparation of lamellae of cells and micro crystals by cryo-FIB will greatly expand the capability of cryo-ET, MicroED and SerialED at SciLifeLab Solna.

Estimated annual total funding (MSEK) needed from SciLifeLab:

1 M SEK

Additional comment:

None

139: Electron cryo-tomography set up which includes: cryo-FIB-SEM enabled with CLEM (eg, Aquilos 2 Cryo-FIB, the Thermo Scientific iFLM Correlative System); a high pressure freezer

Drug Discovery and Development

Vivek Singh, Dr., Karolinska Institutet
vivek.singh@ki.se

***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher (Joanna Rorbach lab, Karolinska Institutet)

The technology would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

As cryo-ET allows us to visualize macromolecular complexes in situ, this is the next logical step and can provide breakthroughs beyond the limitations of single particle (SP) cryo-EM.
Joanna Rorbach's lab (where I am post-doc) works with human mitochondrial protein synthesis. Many clinically relevant complexes such as ribosome assembly intermediates or inner membrane-bound actively translating ribosomes cannot be purified from cells as they are too unstable in vitro. We will soon be looking at a potential exhaustion of information that can be practically extracted with traditional SP cryo-EM.
To study these processes in situ we to directly freeze cell/tissue samples or purified mitochondria. Simple vitrification that the existing set up allows may work for purified organelles but unlikely to work for cells/tissues which require high pressure freezing. Even purified mitochondria are too dense and require FIB milling capabilities. Further, complexes of interest can be quite sparse and thus region of interest hard to locate. We can tackle this with a high through-put set up aided by an integrated cryo-confocal imaging.
These facilities are only partly available at 3D-EM facility at KI, Biomedicum so that it is doable but with slow through-put due to an older set up.
This is one of the urgently needed facilities, as many elsewhere have already started to invest heavily in this.
Thankyou!

Estimated annual total funding (MSEK) needed from SciLifeLab:

about 40-70 MSEK to acquire and set up the facility

Additional comment:

None

140: Mass photometry

Guillaume Gaullier, PhD, Uppsala University
guillaume.gaullier@kemi.uu.se

Drug Discovery and Development
***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher

The technology would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology
Integrated Structural Biology
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

I do not know

Is the technology currently available as local infrastructure service in Sweden?

I do not know

Brief description of the technology:

Mass photometry (MP) is a recently developed biophysical technique, now commercialized by the company Refeyn: https://www.refeyn.com

MP enables label-free, in-solution measurement of the molecular weight of biomolecular complexes from 30 kDa to 5 MDa, quick to perform (one measurement takes a few minutes). As a single-molecule method, it is more versatile than SEC-MALS or DLS: it does not need separation of biomolecules and provides information on all species in solution, allowing to assess purity, heterogeneity, stability and stoichiometry. Most importantly, it has much lower sample requirements, allowing its use for even the samples most difficult to prepare. Its broad applicability makes it useful to all biochemists, in academia and beyond.

Easy access to MP for researchers in Sweden would highly strengthen the Integrated Structural Biology unit.
A common issue in single-particle cryoEM is dissociation of a complex upon vitrification: MP would allow rapid screening of conditions that stabilize a complex, and optimize the use of screening microscopes (a bottleneck in cryoEM).
With recent advances in image analysis, cryoEM can study heterogeneous mixtures, but this remains challenging. Knowing how many species are present and their molecular weights from MP would greatly help such analyses, allowing researchers to address more difficult projects (for instance, purification from native sources instead of in vitro reconstitution from recombinantly produced components).

Estimated annual total funding (MSEK) needed from SciLifeLab:

The price range of one instrument is maybe 1 to 2 MSEK (not sure, impossible to find out without requesting a quote).
Ideally, there should be 3 or 4 instruments in infrastructure units, distributed across Sweden (Umeå, Uppsala, Stockholm, Gothenburg, Lund, for example).
This technology is very easy to use, so it would require less than a full-time person per instrument to train users, who could then measure in autonomy.

Additional comment:

None

141: Preclinical Multimodal Imaging Systems (PMIS)

Eva Forssell-Aronsson, Professor, University, Health care, Sahlgrenska University Hospital
eva.forssell_aronsson@radfys.gu.se

Drug Discovery and Development
***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher, A group of researchers, Infrastructure (Sahlgrenska Bioimaging Center, ca 30 groups)

The technology would fit in the SciLifeLab Platform(s):

Spatial Biology
Cellular and Molecular Imaging
Drug Discovery and Development
Bioinformatics

The suggested technology would contribute to following capabilities:

Precision Medicine

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Precision medicine is rapidly evolving and state-of-the-art pre-clinical imaging infrastructures are critical to accelerate translational research and clinical implement. Access to Next-Generation imaging systems that enable simultaneous acquisition from several imaging modalities in longitudinal studies is a current gap in research infrastructure in Sweden.

We have secured funding for a state-of-the-art Pre-clinical Multimodal Imaging System (PMIS) with MRI (magnetic resonance imaging), PET (positron emission tomography), SPECT (single photon emission tomography), and CT (computer tomography), and functional ultrasound (US). The imaging infrastructure will be nationally unique and internationally competitive with MRI, PET, SPECT and CT delivered by the same vendor, enabling simultaneous acquisition from two image modalities and the possibility of subsequent imaging in the same position with the other modalities. This enables true multimodality imaging in order to fully correlate imaging data from all four modalities. Furthermore, the US system is unique in Sweden and has very high sensitivity and spatiotemporal functional resolution with real-time imaging possibility.

The new PMIS at SBIC will attract a broad user base across academia, healthcare and industry nation-wide. Multimodality imaging is crucial for localisation of biomarker expression, in drug development and other types of translational research and helps to bridge the gap from research to clinical routine.

Estimated annual total funding (MSEK) needed from SciLifeLab:

The new cutting-edge imaging technology (PMIS) will be part of SBIC at Experimental Biomedicine (EBM), within Core Facilities (CF) at University of Gothenburg. SBIC will be fully integrated with CFs well established, open access research, with a vast experience in successfully running national research infrastructures. We seek funding of salary costs to enable the platform to operate as a national infrastructure within SciLifeLab. This includes a Platform Scientific Director (20% FTE, 0.38 MSEK), a Platform Manager (50%FTE, 0.59 MSEK) and an administrative support (20%FTE, 0.18 MSEK), at a total cost of ~1.1 MSEK annually.

Additional comment:

The Bioimaging Center at EBM was founded in 2002 as part of the SWEGENE project - a regional infrastructure in the South-West of Sweden, and later continued as a local infrastructure for researchers in academia, healthcare and industry in the Gothenburg area.

The procurement of the new state-of-the-art PMIS described here is in late phase. The eqiopment will be installed in the refurbished imaging facility at EBM during 2024.

142: Programmable Medicines Foundry

Sten Linnarsson, Professor, prefekt, Karolinska Institutet
sten.linnarsson@ki.se

Drug Discovery and Development
***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Department of medical biochemistry and biophysics)

The technology would fit in the SciLifeLab Platform(s):

Chemical Biology and Genome Engineering
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Gene editing, synthetic biology, single-cell biology and AI are all converging to a new paradigm of biomedical research. Programmable drugs based on synthetic DNA or RNA delivered using nanoparticle vectors will soon become the dominant class of medicines. They will democratize drug development by radically narrowing the gap between basic discovery and clinical trial.

The proposed new facility will help researchers rapidly develop in silico-designed DNA or RNA for cell type-specific delivery to selected organs, in vitro, in vivo and for clinical trials. It will offer three services:

The Discovery service will offer in vitro and in vivo multiplex screening of lipid nanoparticle formulations and nucleic acid vectors. Multiplex pooled libraries will be provided for users to screen their tissue of interest using single-cell readout for specificity.

The Development service will offer R&D-scale; production of individual LNP formulations, suitable for use in vitro and in animals, as well as advice in vector design.

The GMP Manufacturing service will offer early clinical-grade GMP production of validated LNP formulations and vectors, as well as advice and support for IND applications. The goal will be GMP production with less than three months turnaround, made possible by the fact that nucleic acid drugs have predictable pharmacological properties.

The Foundry will be transformational by enabling the rapid translation of preclinical findings to clinical trials.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Rough initial estimate based on other GMP facilities: 12 – 18 MSEK/year plus 5+5 MSEK additional startup investments year 1 and 2.

Additional comment:

Reagent costs, including GMP-grade lipids and RNA/DNA (which will be outsourced), and amortised cost of instruments, will be covered by user fees.

143: Seahorse Agilent XF (24 or 96 well setup suitable for mitochondria or spheroid analysis)

Drug Discovery and Development

Wojciech Michno, Assistant Professor, Uppsala University
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***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Molecular Geriatrics, Rudbeck laboratory)

The technology would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Spatial Biology
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Precision Medicine

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Such instrumentation is an indispensable tool in metabolic research.
This platform is robust and highplex allowing for screening and pathway studies.

Estimated annual total funding (MSEK) needed from SciLifeLab:

3 millon

Additional comment:

None

144: Tailored services for precision medicine to bridge the gap between bedside and bench

Kaska Koltowska, Associate Professor, Uppsala University
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Drug Discovery and Development

***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (I represent 20 research groups across Sweden)

The technology would fit in the SciLifeLab Platform(s):

Clinical Genomics
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

Yes, DanioReadout at Uppsala University has these services

Brief description of the technology:

DanioReadout is a ground-breaking service platform based at Uppsala University with a visionary goal to revolutionise precision medicine and bridge the gap in healthcare treatment development. DanioReadout is dedicated to developing unique, customer-tailored services to enable rapid and accurate disease modelling and therapy development.

The key to success lies in its utilisation of zebrafish as a versatile and cost-effective model system, with AI operated image analysis, high-through disease modelling, and drug screening. Unlike traditional murine studies, zebrafish offers a range of advantages, making it an ideal candidate for drug testing and estimation of systemic and toxicological effects. Compliant with the 3R principles, zebrafish embryos are not considered research animals reducing the use of higher-order animals in research.

The future success of DanioReadout is strongly routed in the impressive track record. So far over 50 Swedish and international research groups have used the platform's advanced services, resulting in 40 completed projects.

As we embark on the journey towards precision medicine, data driven science for innovative treatment solutions, DanioReadout stands as a guiding light of assurance. By unlocking the functional understanding of genetic discoveries at an unprecedented scale and cost-efficiency, this service platform embraces the future of healthcare and beckons a new era of transformative breakthroughs for patients and researchers alike.

Estimated annual total funding (MSEK) needed from SciLifeLab:

The estimated total annual funding required is between 2,5 MSEK to 3MEK depending on the level of income from the user fees (which could come up to 0.5 MSEK at the beginning and scale up over the years). To effectively run this service the team requires a project coordinator (100%), research assistant (100%), research assistant (50%), and image analyst (20%), to salary costs sum up to 1,7MSEK. The direct costs are 0,6MSEK and the local costs and indirect costs to 0,7MSEK.

Additional comment:

Under new organisational management, DanioReadout will be at the Department of Immunology, Genetics and Pathology (Medical Faculty, Uppsala University). The operational director will be Beata Filipek-Gorniok, to ensure the continuity of services and efficient project coordination. Kaska Koltowska will be a Scientific Director working together with the advisory board (Carolina Wählby (IT), Aristidis Moustakas (IMBIM), Joakim Holmdahl (CIV), Staffan Svärd (ICM), Johan Ledin (FOI))

145: Whole body counter

Mats Isaksson, Professor, University of Gothenburg
mats.isaksson@radfys.gu.se

Representing:

An individual researcher, A group of researchers

The technology would fit in the SciLifeLab Platform(s):

Drug Discovery and Development

The suggested technology would contribute to following capabilities:

Precision Medicine

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

When working with drug development for e.g. precision medicine, it is important to study biokinetics and metabolism in vivo in the human body to validate translation of preclinical data before clinical trials can start. The applications of whole body counting, i.e. quantification of radioactive elements in the human body, are numerous, including studies of biodistribution, biokinetics and metabolism of radioactive trace elements and radioactive or radiolabelled drugs. Whole body counters are thus valuable for researchers in academia, healthcare and industry. The whole body counter in Gothenburg is a unique facility in Sweden (and internationally) with its two separate detector systems. Data can be obtained both for the whole body, and for localized regions or organs, e.g. thyroid (by the scanning system). The lab, situated at Sahlgrenska university hospital, is built from low activity materials and equipped with high efficiency ventilation, in order to minimize the contribution from background radiation to increase the sensitivity. To further reduce the contribution from background radiation, each detector system is housed within a separate chamber built from pre-World War II steel. The resulting background is thus very low and permits even very low activity levels in the human body to be measured with great accuracy.

Estimated annual total funding (MSEK) needed from SciLifeLab:

We seek funding of salary costs to enable the whole body counter to operate as a national infrastructure within SciLifeLab. This includes a Manager (30%FTE, 0.35 MSEK) and an administrative support (20%FTE, 0.18 MSEK), at a total cost of ~0.5 MSEK annually.

Additional comment:

The lab and equipment is today mainly used for local projects in Gothenburg, but is not a formal intrastructure included in the Core Facility at University of Gothenburg. The facility could be used by more researchers nationally and internationally.

146: Computational Analytics Support Platform (CASP)

Kate Bennett, Platform Manager (PhD), Umeå University
katie.bennett@umu.se

***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (Computational Analytics Support Platform (CASP))

The facility would fit in the SciLifeLab Platform(s):

Metabolomics
Spatial Biology
Cellular and Molecular Imaging
Chemical Biology and Genome Engineering
Clinical Proteomics and Immunology
Drug Discovery and Development
Bioinformatics

Facility location:

Umeå University

Contact person for the facility:

Dr Kate Bennett

Contact person email address:

katie.bennett@umu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

The Computational Analytics Support Platform (CASP) is a data analytics service at Umeå University that primarily supports, but also trains life scientists in the analysis of experimental data, helping researchers unravel complex chemical and biological systems.

Since the platform began in 2021, CASP has supported researchers locally and nationally from diverse research backgrounds including health and disease, environmental toxicology, pharmaceuticals, agriculture and infection biology. CASP also acts as a valuable support to the Swedish Metabolomics Centre, supporting users with both the analysis and biological interpretation of data.

Their focus is on the analysis of phenotypic/non-genomic data from a wide range of technologies including, but not limited to, downstream omics (metabolomics/proteomics), spectroscopy and imaging. CASP provides researchers with advanced data-driven tools and strategies primarily within multivariate data analysis, but also AI/deep learning, univariate statistics, pathway analysis and statistical experimental design.

The uniqueness of CASP arises from their interdisciplinary nature. Combined, the group have strong expertise in data-driven life science, not only understanding statistics and modelling, but have wide domain knowledge arising from active engagement in numerous projects particularly in the 'omics' area and beyond. This allows for a full understanding of the researcher's needs, not only in terms of the data analysis, but also in how the data was generated and equally important, the interpretation of the biology behind the project. Support can be provided from day one starting with experimental design, quality control of generated data, basic to in-depth data analysis, through to interpretation of results and publishing.

CASP's mission is to help bridge the existing gap in data-driven life science by continuing to provide a valuable and much needed support to the life science community in Umeå and beyond.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility, Providing services to researchers primarily from Umeå University and other Swedish Universities.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

CASP would require annual funding of 1 MSEK from SciLifeLab, to cover the salary costs of one

Kate Bennett, Platform Manager (PhD), Umeå University
katie.bennett@umu.se

***Please note that this proposal is also found under other platforms*

member of staff dedicated to service.

Co-funding plans:

Support from Umeå University (including the Chemical Biological Centre):
2023-2024 – received 1.8 MSEK after being recognised as an infrastructure with potential to become of national interest
2025+ (estimate ~500 KSEK/year)

Future applications:
VR for research infrastructures of national interest (6 years funding (50% of total budget))
KAW – Proof of Concept Grant Program (2 years, 1-4 MSEK)

Income from user fees (estimate ~1 MSEK/year)
At present, user fees account for more than 50% of CASP's total revenue presenting CASP as a cost-efficient platform
Income from collaboration partners (estimate ~400 KSEK)

Additional comment:

CASP aims to provide researchers with services and expertise complementary to those offered by existing bioinformatics support platforms including the SciLifeLab Platform NBIS. Together, CASP aims to contribute to a stimulating work environment within the DDLS Data area node, which will be hosted at UmU, with CASP fitting perfectly in to three of the strategic DDLS research areas; Epidemiology and Biology of Infection, Cell and Molecular Biology and Precision Medicine and Diagnostics.

147: DanioReadout

Beata Filipek-Gorniok, PhD, Uppsala University
beata.filipek.gorniok@ebc.uu.se

Drug Discovery and Development
***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (DanioReadout service facility (former GEZ))

The facility would fit in the SciLifeLab Platform(s):

Clinical Genomics
Chemical Biology and Genome Engineering
Drug Discovery and Development

Facility location:

Uppsala University

Contact person for the facility:

Beata Filipek-Gorniok

Contact person email address:

beata.filipek.gorniok@ebc.uu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

https://www.youtube.com/watch?v=6j0fGAiP9ao&t;=10s
DanioReadout (former Genome Engineering Zebrafish, Uppsala University based SciLifeLab National Facility) has, since 2016, served more than 50 Swedish and international research groups. Facility services included advanced services for disease modeling and project management as well as zebrafish husbandry and publication support resulting in more than 40 scientific publications. GEZ and DanioReadout are organizing world standard seminar series, workshops and conferences to educate researchers and students and raising interest and awareness of the zebrafish model's advantages and disadvantages.

How is the facility providing infrastructure services today?

As a local core-facility, Curently, DanioReadout is focusing on the development of the cancer modeling in zebrafish embryo for the Uppsala based research groups.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

The estimated annual funding required for the DanioReadout is between 2,5 MSEK to 3MEK. The potential future user fees are estimated to be around 0.25-0.7MSEK/year.
Currently DanioReadout is composed of 1.15 FTA and the funding structure is based on the user fees. Local Uppsala University SciLifeLab is currently working on establishing DanioRadout as a local facility. Several grant applications involving DanioReadout as an essential collaborator has been submitted.

Additional comment:

None

148: FragMAX platform

Tobias Krojer, Dr, Lund University
tobias.krojer@maxiv.lu.se

Drug Discovery and Development
***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (MAX IV Laboratory)

The facility would fit in the SciLifeLab Platform(s):

Chemical Biology and Genome Engineering
Drug Discovery and Development

Facility location:

MAX IV Laboratory

Contact person for the facility:

Tobias Krojer

Contact person email address:

tobias.krojer@maxiv.lu.se

Current number of unique users annually:

1-10

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

Fragment screening is an effective and low-cost method for identifying starting points for drug or tool compound development. MAX IV Laboratory's FragMAX facility provides crystallographic fragment screening at the BioMAX and MicroMAX beamlines. It can be accessed through biannual calls via the MAX IV user programme.
The platform, which has been in operation since 2020, is made up of four key components: (i) a crystal preparation facility, (ii) freely available fragment libraries, (iii) automated diffraction data collection at the BioMAX beamline, and (iv) a web application for large-scale data processing. The crystal preparation laboratory is hosted by the Lund Protein Production Platform (LP3) and uses shared protein crystallisation equipment. FragMAX was designed for fragment screening, but it can support all structure-based drug development projects that require rapid determination of many protein-ligand complex structures.
We propose a new, science-driven and FragMAX-enabled gateway for CBCS and DDD to MAXIV. If projects at CBCS and DDD require structural information to proceed, they will be able to directly access the platform. FragMAX staff will evaluate feasibility, design the project, execute the experimental steps and, if necessary, recommend the inclusion of other SciLifeLab infrastructures to provide suitable starting materials like purified protein. FragMAX can already support all steps from initial crystallisation trials to final crystal structures due to its co-location with LP3 and custom-made computational tools that accelerate the X-ray data processing and analysis part. Projects can be run concurrently and continuously, resulting in quick turnaround of results. By combining the technical capabilities of two major Swedish infrastructures and therefore enabling that projects are guided by scientific need and do not depend on user expertise, we will be generating new synergies for early stage drug discovery in Sweden.

How is the facility providing infrastructure services today?

As a national facility, FragMAX can be accessed by national and international users through the MAX IV user program

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

This proposal is built on an existing platform, so no investments are required. Additionally, its running costs are low. Academic users can use MAX IV free of charge. FragMAX is managed by a permanently employed beamline scientist (ca. 1.5 MSEK for salary p.a. provided by MAX IV). Furthermore, the platform is supported until the end of 2024 by an LP3 research engineer on a part-time basis. To serve as a new SciLifelab node, we need funding from SciLifeLab to maintain ongoing support from a research engineer and to fully fund the position so that comprehensive project support can be provided (1.2 MSEK for salary per year). We anticipate that consumables will require funding of 0.1 MSEK per year, but no user fees will be charged unless non-standard experiments are requested.

148: FragMAX platform (cont.)

Tobias Krojer, Dr, Lund University
tobias.krojer@maxiv.lu.se

Drug Discovery and Development
***Please note that this proposal is also found under other platforms*

Additional comment:

The PPS unit, LP3, is preparing to join SciLifeLab Lund in order to provide extended protein crystallography support. Our proposal does not seek to compete with existing or new infrastructures, but rather serve as an node that facilitates usage of their unique capabilities to support structure-based drug discovery projects within SciLifeLab. In addition, FragMAX will continue to serve national and international users from academia and industry, through the MAX IV user program.

149: Preclinical Cancer Treatment Center

Fredrik Swartling, Assoc. Professor, Uppsala University
fredrik.swartling@igp.uu.se

Representing:

An individual researcher, Infrastructure (Own reserach lab, facility director of PCT center)

The facility would fit in the SciLifeLab Platform(s):

Drug Discovery and Development

Facility location:

Uppsala University

Contact person for the facility:

Tobias Bergström

Contact person email address:

tobias.bergstrom@igp.uu.se

Current number of unique users annually:

1-10

The suggested facility would contribute to following capabilities:

Precision Medicine

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

The Preclinical Cancer Treatment (PCT) Center is a SciLifeLab, U-CAN and Uppsala University sponsored pilot facility located at the Rudbeck Laboratory, Uppsala. The PCT Center is part of Dept. of Immunology, Genetics and Pathology and provide services for preclinical and clinical researchers that are evaluating novel drugs in combination with standard treatments in vivo or that conduct controlled studies for refining current cancer therapies in vivo.

The facility uses medical systems similar to those used in the clinical setting for treating patients, including surgical operation (both flank tumors and brain tumors), fractionated high accuracy image-guided irradiation (e.g. craniospinal irradiation of CNS) with cone beam CT imaging (SARRP, Xstrahl) and standard chemotherapy treatment. The efficacy of irradiation treatment or of e.g. novel targeted therapies can be further evaluated using bioluminescent imaging using either 2D (NightOwl II, Berthold Tech.) or 3D IVIS (MuriGLO, Xstrahl) cameras.

The PCT center already collaborate with DDD (UDOPP in Uppsala) in providing service for their customers that would like to use in vivo ADME studies. Here, the PCT center together with UDOPP generate critical data regarding the absorption of a drug candidate, how it's distributed into target tissues and metabolic pathways, and how it's excreted from the body.

Apart from helping customers from Lund Univ., Uppsala Univ. and Karolinska Inst., the PCT-center has provided GLP-standard in vivo support and evaluated immunotherapies for three companies that tested their drug candidates together with standard of care. The PCT center is unique as no other center in Sweden can provide customers with such flexible high-quality service of in vivo models, including immunocompetent models/transgenes as well as PDX-models for various types of cancer. The PCT-center also offer dose-response and efficacy services of compounds on cell cultures together with radiation and chemotherapies.

How is the facility providing infrastructure services today?

As a national facility, mostly customers from academia: KI, Lund, Uppsala but also customers from three companies

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

1.5-2 MSEK per year

Additional comment:

Currently the PCT center is supported (500000 SEK/year) by our local infrastructure at medfarm UU: 2023-2025.

150: X-Ray Diffraction Facility

Uwe Sauer, Assoc. Prof., Umeå University
uwe.sauer@umu.se

Drug Discovery and Development
***Please note that this proposal is also found under other platforms*

Representing:

Infrastructure (X-Ray Diffraction Facility (XRDF), KBC UmU)

The facility would fit in the SciLifeLab Platform(s):

Cellular and Molecular Imaging
Integrated Structural Biology
Drug Discovery and Development
Bioinformatics

Facility location:

Chemical Biology Centre KBC & Dept. of Chemistry, Umeå Univ.

Contact person for the facility:

Dr. Uwe Sauer

Contact person email address:

uwe.sauer@umu.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

Since 2008 the X-Ray Diffraction Facility (XRDF) operates at the Chemical Biology Center (KBC) and the Dept. of Chemistry, UmU (https://www.umu.se/en/research/infrastructure/x_ray_diffraction_facility/). It collaborates with the Protein Expertise Platform (PEP, UmU), a node of the Protein Production Sweden (PPS) National infrastructure for protein production.
Services provided: nano-drop robotic crystallization screens; optimization of crystal growth; screening of drug fragments and drug candidates by co-crystallization (in collaboration with CBCS Umeå/KI); cryo crystal preservation and storage in liquid nitrogen; in-house diffraction optimization (resolution and intensities); full cryo-diffraction data collection incl. data processing, 3D crystal structure determination, refinement and validation; deposition of coordinates with the Protein Data Bank (PDB) or the Cambridge Structural Database (CSD). Also, the XRDF can be used for powder and fiber diffraction. The XRDF offers user training for all local equipment.
In collaboration with the Umeå cryo-EM facility (UCEM, SciLifeLab), we provide access to microcrystal electron diffraction (microED) data collection. Further, the XRDF assists with synchrotron preparations, shipments and data collection (e.g. at MAX-IV, Lund), and with Neutron diffraction experiments at the European Spallation Source (ESS, Lund).
Equipment: mosquito robot (SPT LabTech), RockImager1000 (Formulatrix) for automated crystal imaging. Remote image access via a RockMaker Web interface. Fromulator (Formulatrix) liquid handling robot to optimize crystallization set-ups. A high brilliance X-ray source (X8 PROTEUM, Bruker AXS) for in-house data collection with a fine-focused, monochromatic X-ray beam at a wavelength λ = 1.54 Å (Cu- Kα radiation). A CryoStream 700 (Oxford) system to maintain the crystals at 100K during data collection. To our knowledge, this is the only active Swedish academic in-house protein X-ray equipment.

How is the facility providing infrastructure services today?

As a local core-facility, The XRDF is maintaining the crystallization and X-ray diffraction systems and carries out services upon user demand. So far, the XRDF provides the above mentioned services mainly to about 30 researchers associated with the Integrated Structural Biology network at Umeå university and SLU.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Estimated annual funding needed: 2.3 MSEK (see below)
1.5 MSEK (1.5 FTE)
0.3 MSEK (rent)
0.5 MSEK (consumables, service, running costs)

Uwe Sauer, Assoc. Prof., Umeå University
uwe.sauer@umu.se

Income:
Dept. of Chem.: 0.18 MSEK (0.2 FTE)

Rent, instrument running costs and consumables amounts to about 0.5 MSEK per year. Costs are covered mainly by user fees. Together with the equipment worth many millions in purchase value, this would represent the co-funding for a SciLifeLab-incorporated platform. In order to be able to offer national services within our current capabilities and to meet future needs (microED, MAX-IV and ESS), we would require 1.5 FTE, requiring 1.5 MSEK per year from Scielifelab.

Additional comment:

Two other PPS members, LP3 in Lund and PSF at KI, also have capabilities for crystallization and 3D structure determination. Together, we see opportunities to join forces when entering the SciLifeLab ISB platform and to together providing expertise and local direct access to protein crystallography environments.
The XRDF at Umeå Univ., with its unique X-Ray generator, will provide data collection opportunities in the North of Sweden, thus complementing MAX-IV.

151: ZSC BSL3

Åke Lundkvist, Professor, Uppsala University
ake.lundkvist@imbim.uu.se

Drug Discovery and Development
***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Zoonosis Science Center (ZSC))

The facility would fit in the SciLifeLab Platform(s):

Drug Discovery and Development
None of the existing platforms

Facility location:

BMC, UU

Contact person for the facility:

Åke Lundkvist

Contact person email address:

ake.lundkvist@imbim.uu.se

Current number of unique users annually:

1-10

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

Running BSL-3 lab with well-trained personel. More than 30 years of experience on zoonotic and pandemic viruses and bacteria

How is the facility providing infrastructure services today?

As a national facility, I do not know, We have had support (FISK) for 6 years building up the infrastructure (until end of 2022)

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Required SciLifeLab funding: 3 million
User fee income: 0.5 million
Co-funding (VR, EU): 2 million

Additional comment:

The COVID-19 pandemic most clearly showed the need of active BSL-3 labs as well as real experts in this field.
We have all needed expertise but urgently need a stable funding, which includes a lab-manager and technical personel, as well as support for all BSL-3-specific costs as training, technical service, unique equipment, protective gears, permissions, etc., etc.

Proposals on Technologies/Infrastructure units with no Specific Platform Suggested

Proposals on New Technologies p. 224

Proposals on New Infrastructure Units p. 225-237

152: Agilent Infinity HPLC for profiling of host-pathogen interactions in BSL3 settings

Proposals on Technologies with no specific platform suggested

Andrea Fossati, PhD, Karolinska Institutet
andrea.fossati@scilifelab.se

Representing:

An individual researcher (I am incoming DDLS fellow.)

The technology would fit in the SciLifeLab Platform(s):

None of the current platforms

The suggested technology would contribute to following capabilities:

Pandemic Laboratory Preparedness
Data Driven Life Science

Is the technology currently available as local infrastructure service in Sweden?

No

Brief description of the technology:

Currently there is a lack of tools for profiling host-pathogen interactions in a high-throughput manner and without single-protein over expression and SciLifeLab does not offer these services in BSL3. I do strongly think this is a much-needed addition to the pandemic preparedness program and overall increase in BSL3 capacity to be able to generate pathogen interactomes using co-fractionation mass spectrometry as this enables the characterization of molecular networks across pathogenic variants or pathogens at an unmatched throughput and sensitivity.

Beside host-pathogen profiling the proposed HPLC can be used for general protein-protein interaction studies as well as protein-rna/dna or protein-antibodies studies. It is a flexible instrument and setup and I as one of the leading developer of the technique could provide support/training for users and assist in data analysis.

Estimated annual total funding (MSEK) needed from SciLifeLab:

Quote received for the system is 1.261.378 SEK (without a 20% discount) and with the possibility of further discounts. The PM costs would be around 10k sek/year and consumables (columns/guard columns cartridges/collection plates) would be around 70-100k sek a year.

Additional comment:

None

153: Cell and Gene Therapy Core

Anna Falk, Prof, Lund University
anna.falk@med.lu.se

Representing:

Infrastructure

The facility would fit in the SciLifeLab Platform(s):

None of the existing platforms

Facility location:

Lund Stem Cell Centre, Lund University

Contact person for the facility:

Anna Falk

Contact person email address:

anna.falk@med.lu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

The Cell and Gene Therapy Core (CAGT Core) at Lund Stem Cell Centre, was formed in 2022 by a merger of three established core facilities (vector core, CRISPR Facility and iPS Core). Our expertise is focused on induced pluripotent stem cells (iPSCs), genomic engineering and viral vector production all of which are integral tools for basic research, disease modelling, precision medicine and Advanced Therapy Medicinal Products (ATMP). The goal of the platform is to continue to deliver state-of-the art cell and gene therapy tools to local, national and international customers.

The CAGT Core is one of its kind in Sweden by offering iPSC reprogramming and iPSC gene-editing, and is strongly connected to both European and US-based core networks (e.g. CorEUStem and COREdinates). These connections are vital to maintain all our technologies state-of-the art and in accordance with international standards.

The CAGT is run by the coordinator Dr. Pia Johansson and the scientific director Prof. Anna Falk, and consists of two research engineers and two research assistants. The CAGT scientific advisory group consists of four professors with specific expertise in technologies relevant to the CAGT. Currently, the CAGT is mainly funded by user fees and the Strategic Research Area Stem Therapy.

Current services:
• Reprogramming of blood and skin cells into iPSC using mRNA and Sendai virus.
• iPSC quality control using molecular karyotyping, g-banding and directed differentiation technologies.
• Custom gene-editing of iPSC using CRISPR technologies.
• Custom high titer lentiviral and AAV preparations.

Planned services:
• Establishment of pre-GMP standard operating procedures for iPSC reprogramming, growth and handling as well as for viral vector production.
• Custom mRNA production services using in vitro transcription technology.
• Differentiation services of iPSCs into neural progenitor cells, cerebral organoids, microglial cells, and hematopoietic stem cells.

How is the facility providing infrastructure services today?

As a local core-facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

We request annual funding of 3MSEK to cover the increase in staff and space to be able to expand from a local to a national facility.

2022 Expenses (SEK)
Salaries: 4 871 186 (5x100%)
Rent: 315 296
Running costs: 1 978 687
R&D;: 1 000 000
Equipment: 800 000
Sum: 8 965 169

153: Cell and Gene Therapy Core (cont.)

Anna Falk, Prof, Lund University
anna.falk@med.lu.se

2022 Income (SEK)
User fees: 1 611 333
Start-up support stem therapy(ST): 1 800 000
ST support: 5 560 910
R&D;: 1 000 000
Equipment: 800 000
Sum: 8 972 243

2025 Expenses (SEK)
Salaries: 7 100 000 (7x100%)
Rent: 600 000
Running costs: 2 500 000
R&D;: 900 000
Equipment: 400 000
Sum: 11 500 000

2025 Income (SEK)
User fees: 2 500 000
Support ST: 4 00 0000
R&D;: 1 000 000
Equipment: 500 000
Other sources e.g. other SRAs, Swelife: 500 000
SciLife Lab: 3 000 000
Sum: 11 500 000

Additional comment:

Human iPSCs have revolutionised medical research and will be instrumental in the new era of precision medicine and ATMP. The ability of iPSC to be differentiated into any cell type enable creation of large cohorts of disease relevant cell models for comparative multi-omics investigations. However, iPSCs are also highly sensitive cells that need to be kept pluripotent. Expertise-driven procedures and specialized facilities are vital for the quality and continued reliability of the iPSC field.

154: Customized Microfluidics

Maria Tenje, Prof., Uppsala University
maria.tenje@angstrom.uu.se

Representing:

Customized Microfluidics

The facility would fit in the SciLifeLab Platform(s):

I do not know

Facility location:

Ångström Laboratory, Uppsala University

Contact person for the facility:

Maria Tenje

Contact person email address:

maria.tenje@angstrom.uu.se

Current number of unique users annually:

1-10

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

Customized Microfluidics is located at the Department of Materials Science and Engineering and has been operating as a SLL-Uppsala local unit since 2016 (www.customizedmicrofluidics.se). The mission of Customized Microfluidics is to support researchers in the life sciences who want to use microfluidic solutions in their research projects. This can e.g. be systems for chemical analyses with extreme throughput, systems that enable microscopy of large numbers of cells in a systematic way or systems that can be used to study cell-cell communication in a controlled micro environments. Common to all projects is that they are driven by a basic scientific question within the life sciences and that the microfluidic systems developed enable new and advanced types of studies not possible with current, established techniques.

Customized Microfluidics is today operated in collaboration between the Tenje lab and the Uppsala node of MyFab, the Swedish research infrastructure for micro- and nanofabrication. This has proven a successful endeavor as this type of support facility requires expertise in several areas spanning the life sciences and engineering.

Customized Microfluidics meet users with very different backgrounds and varying levels of understanding of how microfluidic systems are made and used, and we have therefore developed our portfolio of services over the years. Today, we can offer application and system consultancy, design support, device fabrication and we provide a test bed where the new devices can be tested by the users before they make investment in new equipement. This has proven to be a good working model and so far we have delivered microfluidic solutions to 50+ different users across the country from all major universities and in 2023 we obtained VFS funding from UU together with the SME Countagen.

How is the facility providing infrastructure services today?

As a national facility, We have to date delivered to 50+ projects from all major universities across the country.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Budget for Customized Microfluidics is 1 MSEK/yr (including salary, OH, LTK and IT).
140 kSEK/yr can be provided by internal co-funding and we expected user fees to amount to 260 kSEK/yr which leaves a total of 600 kSEK/yr of annual funding to be needed from SLL.

Additional comment:

It is difficult to identify best Platform for Customized Microfluidics as microfluidic solutions and methods can be used in so many different areas and we might reduce visibility by being contained in only one Platform.

155: FACS-machines at SCCR and Microbiology and Immunology department

Anna Martner, Associate Professor, University of Gothenburg
anna.martner@gu.se

Representing:

An individual researcher

The facility would fit in the SciLifeLab Platform(s):

I do not know

Facility location:

SCCR and Microbiology and Immunology dept at University of Gothenburg

Contact person for the facility:

Anna Martner

Contact person email address:

anna.martner@gu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

I do not know

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

At SCCR there are currently two machines, one Fortessa and one Aria, and at Microbiology and Immunology department there are several FACS-macnines, including a Fusion, that are used by many research groups. There are often problems with these FACS-machine, partly due to the many users. Having a person responsible for their maintanance would likley be of big benifit for many research groups at SCCR and at Microbiology and Immunology dept.

How is the facility providing infrastructure services today?

I do not know

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

I do not know

Additional comment:

I am not responsible for all these FACS-machines but I have talked to many researchers that use them that agree that it would be benificial to have them in a core facility.

156: Life Science Nanodevices and Microfluidics

Heiner Linke, Professor, Lund University
heiner.linke@ftf.lth.se

Representing:

Infrastructure (Lund Nano Lab and Lund Lifescience Microfluidics)

The facility would fit in the SciLifeLab Platform(s):

None of the existing platforms

Facility location:

Lund University

Contact person for the facility:

Luke Hankin

Contact person email address:

luke.hankin@ftf.lth.se

Current number of unique users annually:

10-50

The suggested facility would contribute to following capabilities:

Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

Nanodevices, microtechnology and microfluidics are important enablers of excellent life science and biomolecular research, ranging from sequencing to single-cell studies, drug discovery and biomarker detection.

We propose to open existing, excellent, local facilities for nano- and microtechnology and associated competence to national life science research. We will create a single, national life science support point for two infrastructures and environments:

(i) Lund Nano Lab (Myfab Lund), operated by the Strategic Research Area NanoLund, is a world-class clean room laboratory for nanostructure synthesis (semiconductors, metals and nanoparticles), processing and metrology. It is open to national academic research groups and industry and has about 150 annual users, of which about 10 local users from the life science area.

(ii) The Life Science Microfluidics platform, operated by the LTH Profile Area Engineering Health, offers expertise in microfluidic system design and neuro-microtechnology and supports researchers with custom development of microfluidic and lab-on-a-chip systems for life sciences. The current user base is 10-15 local research groups.

Both environments have a documented track record in building and managing advanced research infrastructures and offer extensive know-how and competence in life science applications, highlighted by several VR Research Environments, KAW and ERC projects in microfluidics and nanostructure-enabled life science.

We propose to build a comprehensive support structure for life scientists for the whole process chain: from nano- and micro-fabrication and characterization to integration with advanced fluidics control and microscopy. Examples include the use of nano-straws for longitudinal single-cell studies, novel sequencing technology, single-molecule biosensors, microfluidic devices for organ-on-a-chip technology, acoustofluidics-based isolation of extracellular vesicles, and precision cell separation.

How is the facility providing infrastructure services today?

As a local core-facility, As a national facility, Lund Nano Lab is one of four nodes of Myfab, the National Infrastructure for Micro- and Nanofabrication supported by VR. Life Science Microfluidics is a local platform at the faculties for Medicine and Engineering at Lund University.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

The estimated cost of providing access and services to national users from the life science community is about 3 MSEK/year. This includes qualified advice, training and support in

156: Life Science Nanodevices and Microfluidics (cont.)

Heiner Linke, Professor, Lund University
heiner.linke@ftf.lth.se

microfluidics, nanofabrication and -characterization, as well as consumables and overall administration.

Longterm users will be charged user fees at the same level as all other users.

Lund Nano Lab offers access to an equipment park worth about 300 MSEK and running costs are co-financed by about 11 MSEK/year by Lund University and NanoLund, subsidizing all user fees by about 50%.

Life Science Microfluidics offers access to microfluidics lab equipment of approx. 30 MSEK, with significant contributions from Lund University, from the faculties and from NanoLund.

Additional comment:

The infrastructure will complement existing facilities including (i) Customized Microfluidics at Uppsala, (ii) the three other Myfab nodes (in particular Chalmers has related capabilities), and (iii) a planned national resource for lipid nanoparticles coordinated by Chalmers.

We will nationally coordinate investments and ensure (1) that essential local services are offered, while (2) expensive specialized capabilities are not duplicated but are shared to enable excellent research.

157: LU-Fold

Gemma Atkinson, Dr, Lund University
gemma.atkinson@med.lu.se

Proposals on Infrastructure Units with no specific platform suggested
***Please note that this proposal is also found under other platforms*

Representing:

An individual researcher, A group of researchers, Infrastructure (LU Fold facility at Lund University, and my group)

The facility would fit in the SciLifeLab Platform(s):

Genomics
Clinical Genomics
Cellular and Molecular Imaging
Integrated Structural Biology
Bioinformatics
I do not know

Facility location:

Lund University

Contact person for the facility:

Gemma Atkinson

Contact person email address:

gemma.atkinson@med.lu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

LU-Fold is a new Lund University-based facility for helping researchers predict protein structures of interest using the cutting-edge method AlphaFold2 (Nature Methods method of the year, 2021). LU-Fold specialises in high-throughput prediction of protein complexes to predict novel protein-protein interactions. For example, we can predict pairwise interactions of a protein of interest with all other proteins in a proteome to find new binding partners and molecular binding interfaces.

We run as a service, using national high performance computing infrastructure to make high-throughput structural predictions. Users do not have to have any previous bioinformatics or structural biology experience.

Our services include prediction of:
– pairwise binding interactions of a protein of interest with all other proteins in a proteome
– structures of all proteins in a proteome (for instance from a newly sequenced genome)
– higher order structures of larger complexes
– the effects of mutations and truncations on proteins

We also offer training through workshops, tutorials and online guides to help others make predictions, compare structures, visualise results and make publication-quality figures.

This novel service was urgently needed and is receiving significant interest. The facility officially starts in August 2023, and until then the Atkinson lab has been initiating pilot projects within the scope of local and national collaborations. So far we have been collaborating on projects that e.g. find interactions of virus proteins with the human proteome, predict oligomers of bacterial cell division proteins, discover binding partners of proteins associated with childhood cancer neuroblastoma, and predict interactions of proteins involved in neurological disorders. We have made connections with researchers at MAX IV, and the SciLifeLab Cryo-EM and Structural Proteomics units in Lund, who see ample opportunities for partnership and knowledge sharing.

How is the facility providing infrastructure services today?

As a local core-facility, Currently funded solely by Lund University

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

The major cost is salaries as we do not rely on very expensive local equipment and consumables. Currently we have one engineer serving Lund University alone. To offer the service nationally, we

Gemma Atkinson, Dr, Lund University
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would need at least one more staff member, plus at least a 20% director position. Overhead, rent and small running costs are additional budget expenses. As a rough estimate, the total cost of a (minimal) national LU-Fold facility would be between 3 and 3.5 million per year.

We predict it would take a SciLifeLab investment of at least around 1.5-2 million per year to make LU-Fold nationally available. This assumes LU-Fold funding from Lund University remains the same at around 1 million per year, plus some cost recovery with user fees (potentially around 600 000 per year).

Additional comment:

SciLifeLab support of LU-Fold would strategically benefit both entities. For LU-Fold, the additional investment would aid sustainability and ability to help more researchers. For SciLifeLab, with LU-Fold's connection to structural biology, proteomics, genetics, and bioinformatics, there is significant added value, with many opportunities for synergies and integration with other existing SciLifeLab platforms. Education and training activities could be integrated with the SciLifeLab Training hub.

158: Medical Informatics (at CIPA)

Kajsa Paulsson, PhD, Lund University
kajsa_m.paulsson@med.lu.se

Representing:

Infrastructure coordinator FoM, LU + PI

The facility would fit in the SciLifeLab Platform(s):

I do not know

Facility location:

LU

Contact person for the facility:

Emanuel Larsson

Contact person email address:

emanuel.larsson@med.lu.se

Current number of unique users annually:

1-10

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Planetary Biology
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

I do not know

Brief description of the facility:

A human resources infrastructure based on a set of experts at Lund University available through the research infrastructure CIPA. The specialization focuses on the intersection of AI and healthcare. It involves the development and application of computational methods and technologies to improve medical diagnosis, treatment, and patient care. In this specialization we explore topics such as medical image analysis, clinical decision support systems, and health data analysis.

How is the facility providing infrastructure services today?

As a local core-facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

1,65 MSEK per year: 1 MSEK for one full time application expert (80%) and coordinator (20%), and 0,5 MSEK for access to the distributed expertise among the affiliated experts (from LU but also possible from other universities in Sweden), 100 kSEK for premises and equipment, 50 kSEK for travelling.
SciLifeLab 50% of the salaries (e.g., 750 kSEK per year)
User-fees 50% of the salaries (e.g., 750 kSEK per year). The user fees would be increased gradually and the target-level set in agreement with other Human Resources heavy SciLifeLab facilities.
Co-funding host university (LU and CIPA), premises and equipment, travelling: 150 kSEK per year.

Additional comment:

None

159: MS based proteomics facility

Jonas Bergquist, Professor Dr, Uppsala University
jonas.bergquist@kemi.uu.se

Proposals on Infrastructure Units with no specific platform suggested
***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers

The facility would fit in the SciLifeLab Platform(s):

Clinical Proteomics and Immunology
None of the existing platforms

Facility location:

Uppsala

Contact person for the facility:

Jonas Bergquist

Contact person email address:

jonas.bergquist@kemi.uu.se

Current number of unique users annually:

More than 50

The suggested facility would contribute to following capabilities:

Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

More than 50

Brief description of the facility:

High resolution based proteomics - a service succesfully provided for more than 10 years now - as a local facility but for a national snd international customer group.

How is the facility providing infrastructure services today?

As a local core-facility

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

4 MSEK/yr - co-funded by users fees

Additional comment:

None

160: Pandemic preparedness

Mattias Forsell, PhD, Umeå University
mattias.forsell@umu.se

Representing:

An individual researcher (PI for PLP2 effort for biomonitoring of elderly)

The facility would fit in the SciLifeLab Platform(s):

None of the existing platforms
I do not know

Facility location:

Umeå University

Contact person for the facility:

Mattias Forsell

Contact person email address:

mattias.forsell@umu.se

Current number of unique users annually:

1-10

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

We have built for long-term monitoring of disease and immunity among the most sensitive to infectious diseases in Sweden. By coupling national registry data and immunity data on an individual level, the platform provide capability for researchers to monitor disease outbreaks, to evaluate of the effectiveness of disease control measures, and to evaluate immunological responses to infection or vaccination by the ageing immune system. Since October 2021, we are sampling capillary blood from more than 1000 older individuals at 3-month intervals. The individuals are residents from 114 long term care facilities spread over 5 different health care regions of Sweden. The individuals in the study cohort are median age 86 and 64% are females. Mortality data is monitored on a 14-day basis for the population, and recorded data on comorbidities, medication, vaccination, and infections are monitored via national registries. All sampling and data collections are performed under approved ethical permits. We have demonstrated that vaccine induced antibodies determine vulnerability to fatal COVID-19, and defined required doses to provide max protection in this cohort. FHM is a current stake holder in the platform. Additional partners that are involved in methods development and/or studies of infectious diseases other than COVID-19 will be recruited. Moreover, the material gathered from sampling and registries will also be valuable to better understand the ageing immune system and its response to infectious disease. Importantly, the coordination between Care Homes for the Elderly around Sweden will provide continuous data on infectious diseases and can thus act as an early warning system of future pandemics. With long-term funding and additional stake holders, the platform can be maintained and tailored to generate data of national and global importance for infectious disease control and pandemic preparedness. We propose that the platform is integrated in SciLife as separate service.

How is the facility providing infrastructure services today?

As a national facility, The majority is focused on Region Västerbotten / Umeå University but 4 other health care regions and stake holders from 4 other universities are also engaged in the platform/research.

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

To maintain infrastructure for sampling, and the sample volume, we estimate that 1-2 study nurses and 1 technician are required. These will oversee and coordinate sampling, maintain upkeep of sampling volume and process samples, bio banking etc. The sampling strategy involves individual labelling and coupling of sampling cassettes, distribution and return of sampling kits. Moreover, for linking of data from capillary blood to individuals registry data, we propose that at least 1 statistician is employed within the platform. Finally, we propose that roughly 20% salary is funded for manager of facility. A rough estimate of funding for optimal performance of the facility is around 4 MSEK annually. This under the assumption that

160: Pandemic preparedness (cont.)

Mattias Forsell, PhD, Umeå University
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users pay for their own assays.

Additional comment:

The Swedish Public Health Agency is major stakeholder in the platform and co-finance select immunological analysis of capillary samples. Data generated from our combined analysis of data from immunological assays and registries are shared with FHM at weekly or bi-weekly meetings. By this, we have been able to rapidly provide information to support policy makers when forming the Swedish strategy for COVID19 vaccination. Maintenance of the platform will allow for extending this beyond COVID19.

161: ZSC BSL3

Åke Lundkvist, Professor, Uppsala University
ake.lundkvist@imbim.uu.se

Proposals on Infrastructure Units with no specific platform suggested
***Please note that this proposal is also found under other platforms*

Representing:

A group of researchers (Zoonosis Science Center (ZSC))

The facility would fit in the SciLifeLab Platform(s):

Drug Discovery and Development
None of the existing platforms

Facility location:

BMC, UU

Contact person for the facility:

Åke Lundkvist

Contact person email address:

ake.lundkvist@imbim.uu.se

Current number of unique users annually:

1-10

The suggested facility would contribute to following capabilities:

Pandemic Laboratory Preparedness
Precision Medicine
Data Driven Life Science

Estimated unique annual users if the unit become a part of SciLifeLab infrastructure:

10-50

Brief description of the facility:

Running BSL-3 lab with well-trained personel.
More than 30 years of experience on zoonotic and pandemic viruses and bacteria

How is the facility providing infrastructure services today?

As a national facility, I do not know, We have had support (FISK) for 6 years building up the infrastructure (until end of 2022)

Estimated annual funding (MSEK) needed from SciLifeLab, co-funding and user fee plans:

Required SciLifeLab funding: 3 million
User fee income: 0.5 million
Co-funding (VR, EU): 2 million

Additional comment:

The COVID-19 pandemic most clearly showed the need of active BSL-3 labs as well as real experts in this field.
We have all needed expertise but urgently need a stable funding, which includes a lab-manager and technical personel, as well as support for all BSL-3-specific costs as training, technical service, unique equipment, protective gears, permissions, etc., etc.


SciLifeLab