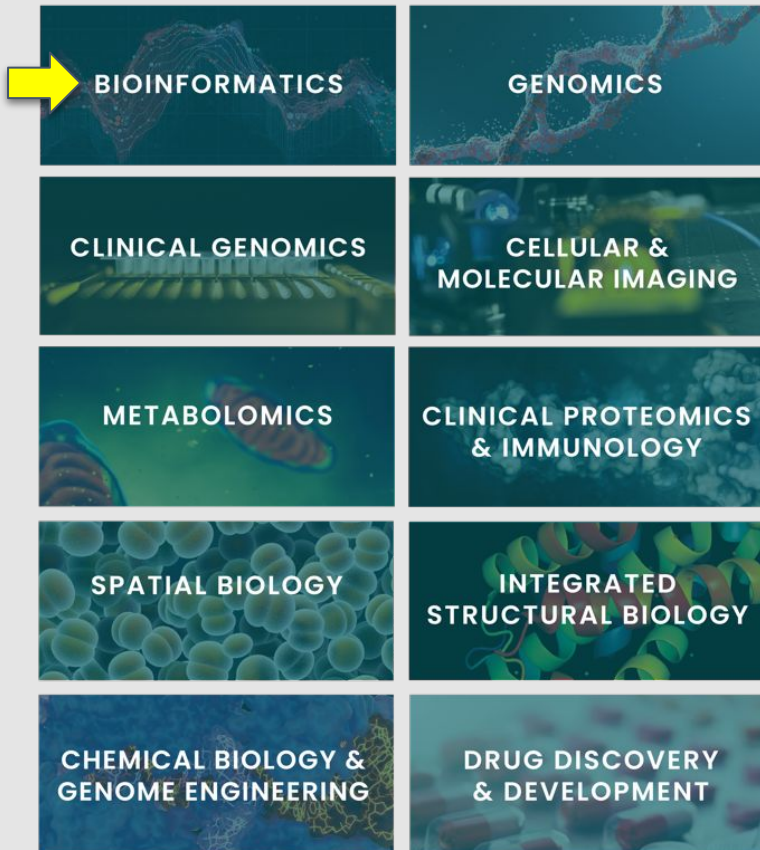


Proteiner, pixlar och populationer: Arbetsätt och lärdomar från att stötta Svenska bidrag till globala biodata-resurser

NBIS - National Bioinformatics Infrastructure Sweden

Wolmar Nyberg Åkerström, NBIS, SciLifeLab

2025-12-16

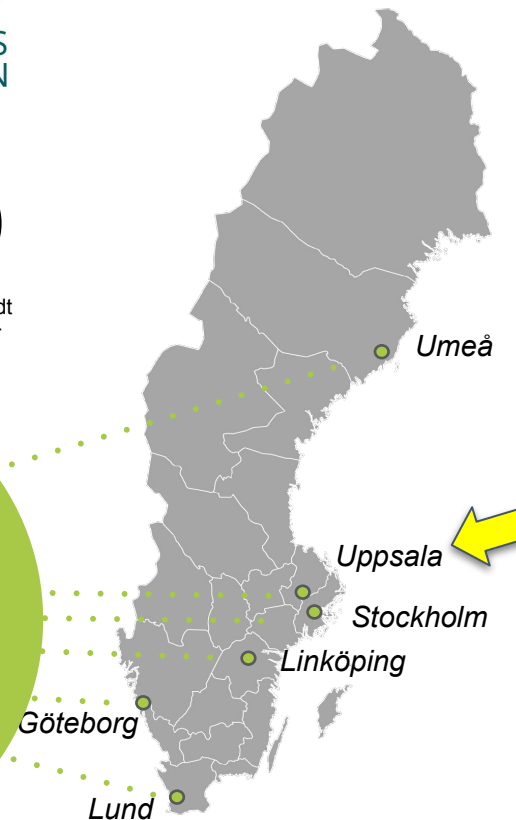


Bengt Persson
Director



Björn Nystedt
Co-director

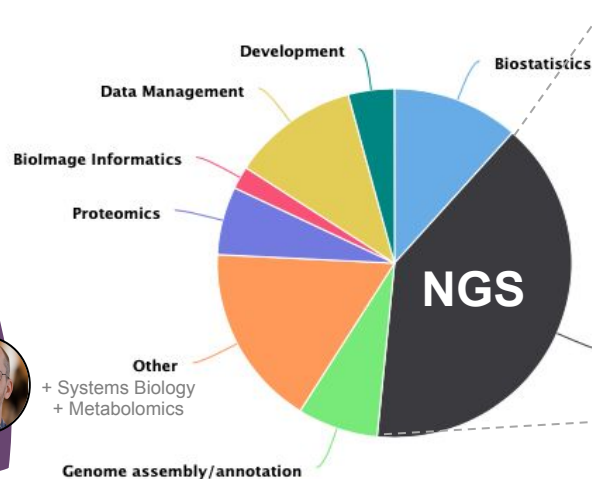
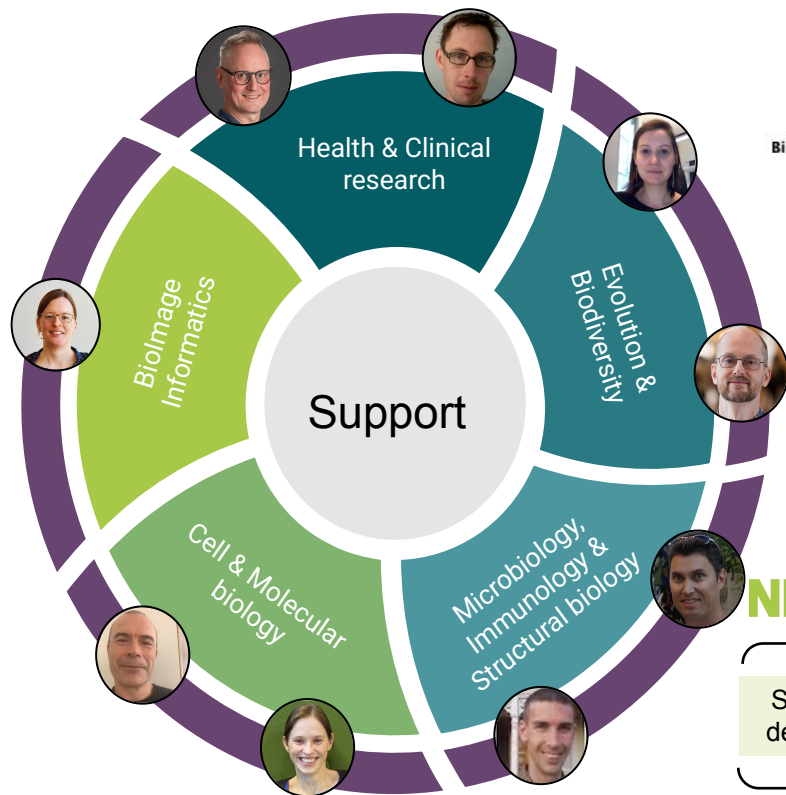
~130 staff at
six different sites
across Sweden
with expertise in
many different
omics-related
areas



NBIS research area teams & subjects



Support



Genomics
Transcriptomics
Single cell analysis
Epigenetics
Metagenomics
Integrative multi-omics
...

NBS



Study design

Data generation

Standard analyses

Project-specific analyses

Publication



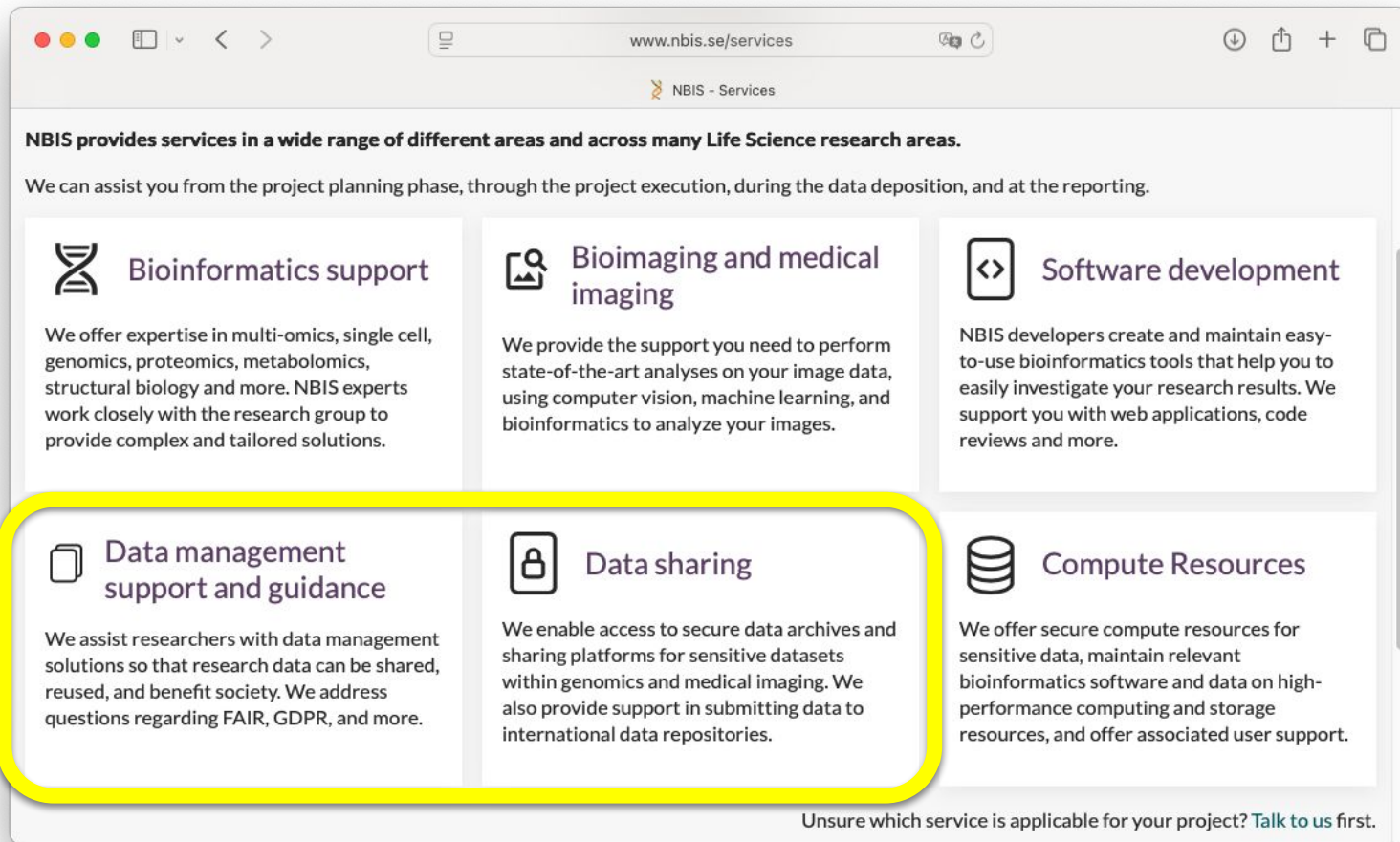
SciLifeLab Platform
or other data generator

NBS



NBS

Services for Swedish Life Science Research



The screenshot shows a web browser window with the address bar displaying 'www.nbis.se/services'. The page title is 'NBIS - Services'. The main heading reads: 'NBIS provides services in a wide range of different areas and across many Life Science research areas.' Below this, a paragraph states: 'We can assist you from the project planning phase, through the project execution, during the data deposition, and at the reporting.' The page features six service cards arranged in a 2x3 grid. The first row includes 'Bioinformatics support', 'Bioimaging and medical imaging', and 'Software development'. The second row includes 'Data management support and guidance', 'Data sharing', and 'Compute Resources'. The 'Data management support and guidance' and 'Data sharing' cards are highlighted with a yellow border. At the bottom right, a note says: 'Unsure which service is applicable for your project? [Talk to us first.](#)'

Bioinformatics support

We offer expertise in multi-omics, single cell, genomics, proteomics, metabolomics, structural biology and more. NBIS experts work closely with the research group to provide complex and tailored solutions.

Bioimaging and medical imaging

We provide the support you need to perform state-of-the-art analyses on your image data, using computer vision, machine learning, and bioinformatics to analyze your images.

Software development

NBIS developers create and maintain easy-to-use bioinformatics tools that help you to easily investigate your research results. We support you with web applications, code reviews and more.

Data management support and guidance

We assist researchers with data management solutions so that research data can be shared, reused, and benefit society. We address questions regarding FAIR, GDPR, and more.

Data sharing

We enable access to secure data archives and sharing platforms for sensitive datasets within genomics and medical imaging. We also provide support in submitting data to international data repositories.

Compute Resources

We offer secure compute resources for sensitive data, maintain relevant bioinformatics software and data on high-performance computing and storage resources, and offer associated user support.

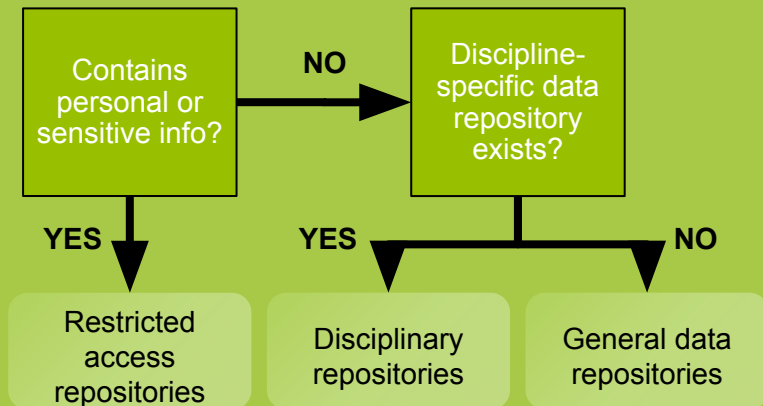
Unsure which service is applicable for your project? [Talk to us first.](#)

Data submission to public repositories

Making the data underlying your research publicly available to others is a fundamental part of a FAIR research process. When publicly available and appropriately described, data can be re-used by yourself as well as others. Domain-specific public repositories offer the most direct routes to making your data FAIR. This workshop will give you the why, where and how of data sharing via repository submission, including hands-on exercise. No prior knowledge is required in order to attend this workshop.

Learning outcomes:

- Know the benefits of data sharing
- Know how to find a suitable repository for different types of data
- Have experience of a repository submission





The screenshot shows a web browser window with the URL `rdmkit.elixir-europe.org/human_pathogen_genomics`. The page header includes the RDMkit logo, navigation links for 'Data management', 'About', 'Contribute', and 'GitHub', and a search bar. A left sidebar lists various data domains, with 'Human pathogen genomics' highlighted. The main content area displays the domain name 'Human pathogen genomics' with edit and share icons, followed by an 'Introduction' section. The introduction text discusses the focus on studying genetic codes of pathogens and the challenges of data management. Below this is a section titled 'Planning a study with pathogen genomic data' which includes a 'Description' of the data types and their origin.

RDMkit

Your domain: Human pathogen genomics | RDMkit

Data management About Contribute GitHub Search RDMkit

Data management

- Data life cycle
- Your role
- Your domain
 - Bioimaging data
 - Biomolecular simulation data
 - Epitranscriptome data
 - Health data
 - Human data
 - Human pathogen genomics**
 - Intrinsically disordered proteins
 - Machine learning
 - Marine metagenomics
 - Microbial biotechnology
 - Plant sciences
 - Proteomics
 - Rare disease data

Your domain

Human pathogen genomics

On this page

Introduction

The human pathogen genomics domain focuses on studying the genetic code of organisms that cause disease in humans. Studies to identify and understand pathogens are conducted across different types of organisations ranging from research institutes to regional public health authorities. The aims can include urgent outbreak response, prevention measures, and developing remedies such as treatments and vaccines.

Data management challenges in this domain include the potential urgency of data sharing and secondary use of data across initiatives emerging from research, public health and policymakers. While pathogenic organisms are the object of interest, there are many considerations to take into account when dealing with samples collected from patients, pathogen surveillance, and human research subjects.

The genomic data can represent anything from the genetic sequence of a single pathogen isolate to various fragments of genetic materials from a flora of pathogens in a larger population. Other data can represent a wide range of contextual information about the human host, the disease, and various environmental factors.

Planning a study with pathogen genomic data

Description

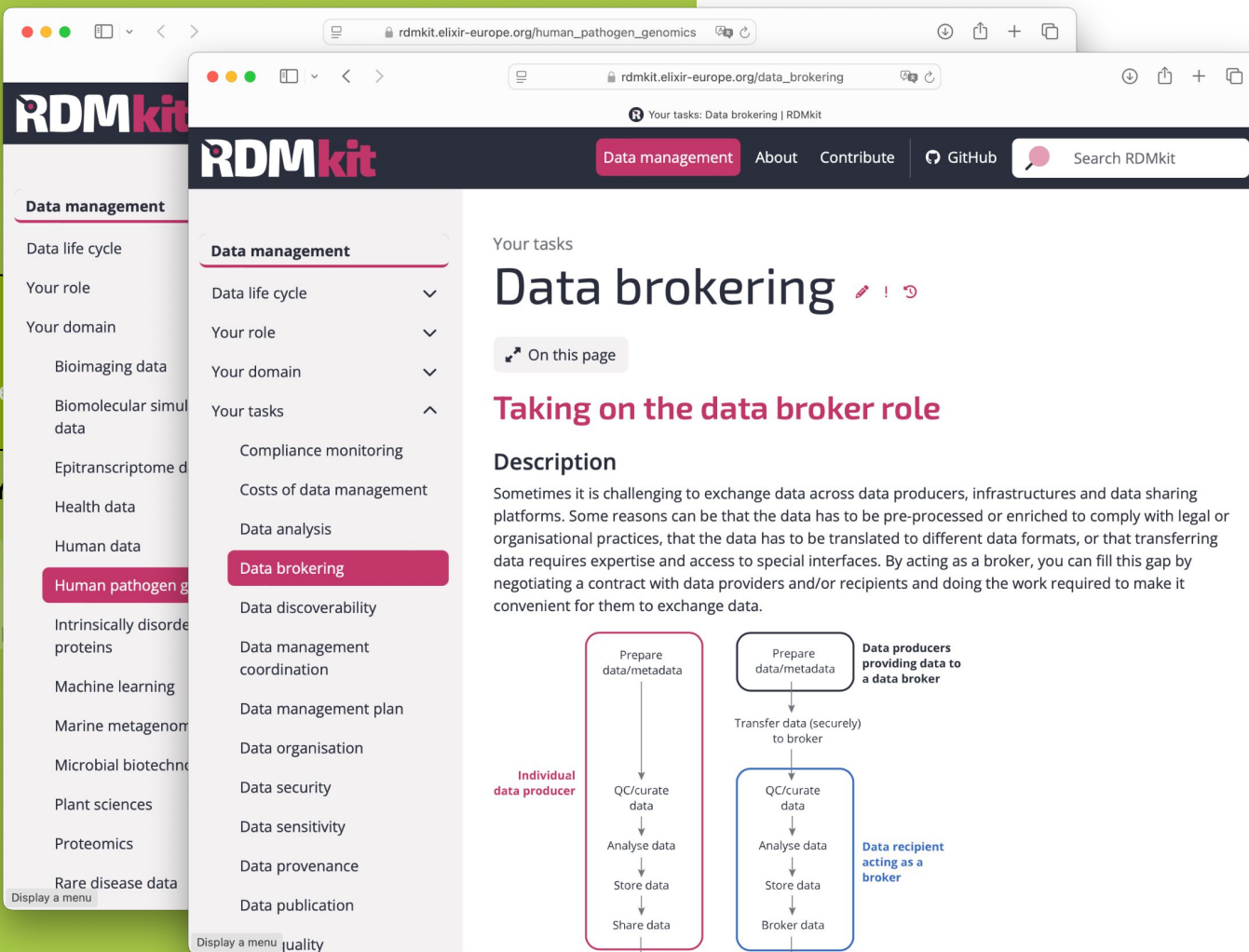
While the objects of interest in this domain are pathogens, the data is usually derived from samples originating from human research subjects. This means that you must plan to either remove or handle [human data](#) during your study.

Submission to public repositories

Making your research publicly available to others is a key part of the FAIR research process. When publicly available, data can be re-used by yourself as well as others. Public repositories offer the most direct routes to achieve this. This workshop will give you the why, where and how of repository submission, including hands-on experience. A certain level of knowledge is required in order to attend this

Workshop of data sharing
Choosing a suitable repository for different types of data
Preparing a repository submission





h publicly available to others is
process. When publicly available
e re-used by yourself as well as
es offer the most direct routes
o will give you the why, where
bmission, including hands-on
in order to attend this

ory for different types of data
bmission



RDMkit

Data management

Data life cycle

Your role

Your domain

Bioimaging data

Biomolecular simulation data

Epitranscriptome data

Health data

Human data

Human pathogen genomics

Intrinsically disordered proteins

Machine learning

Marine metagenomics

Microbial biotechnology

Plant sciences

Proteomics

Rare disease data

Display a menu

RDMkit

Data management

Data life cycle

Your role

Your domain

Your tasks

Compliance monitoring

Costs of data management

Data analysis

Data brokering

Data discoverability

Data management coordination

Data management plan

Data organisation

Data security

Data sensitivity

Data provenance

Data publication

Display a menu quality

Your tasks

Data life cycle

Your role

Your domain

Your tasks

Compliance monitoring

Costs of data management

Data analysis

Data brokering

Data discoverability

Data management coordination

Data management plan

Data organisation

Data security

Data sensitivity

Data provenance

Data publication

Display a menu quality

6159 - Sharing SARS-CoV-2 variant analysis from Swedish wastewater samples

Submission task description

During 2021 and 2022, SLU and KTH have done monitoring of SARS-CoV-2 levels and variants in wastewater from six Swedish cities. The sequences have been published in ENA, but the variant analysis and sequencing run reports need to be submitted to BioStudies.

Procedure overview and links to examples

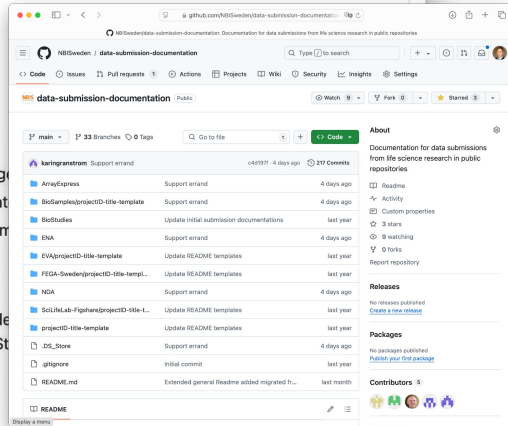
Links

- [Samples sheet](#) - overview of all sequenced samples and submitted data
- [file with PageTab info](#) - might be outdated
- [BioStudies - GitHub](#)
- [BioStudies-PageTab-Example](#)
- [BioStudies-PageTab-Specification](#)
- [Submit help for Biolmage Archive](#) - uses BioStudies
- [File List Guide](#) - Biolmage Archive but shows how to organise files for BioStudies in PageTab submission
- [BioStudies database: aggregating all outputs of a life sciences study](#) - ENA training material
- [A guide to organising data associated to a publication using BioStudies](#) - ENA training material

Procedure

Everything was submitted via the web browser (using PI's account at BioStudies), but the data was also submitted via the PageTab submission, where everything is written in a tsv file which is then uploaded to BioStudies.

Lessons learned



data-submission-documentation

Documentation for data submissions from the science research in public repositories

33 branches 0 tags

Go to file

Code

ArrayExpress Support errand 4 days ago

BioSamples/projectID-template Support errand 4 days ago

BioStudies Update initial submission documentation last year

ENA Support errand 4 days ago

EVAP/projectID-template Update README templates last year

FEQA-Sweden/projectID-template Update README templates last year

NDA Support errand 4 days ago

SciLifeLab-1/figure/projectID-template Update README templates last year

projectID-template Update README templates last year

DSL_Store Support errand 4 days ago

gltipore Initial commit last year

README.md Extended general README added migrated last month

README

About

Documentation for data submissions from the science research in public repositories

Readme

Activity

Custom properties

3 stars

8 watching

0 forks

Report repository

Releases

No releases published

Create a new release

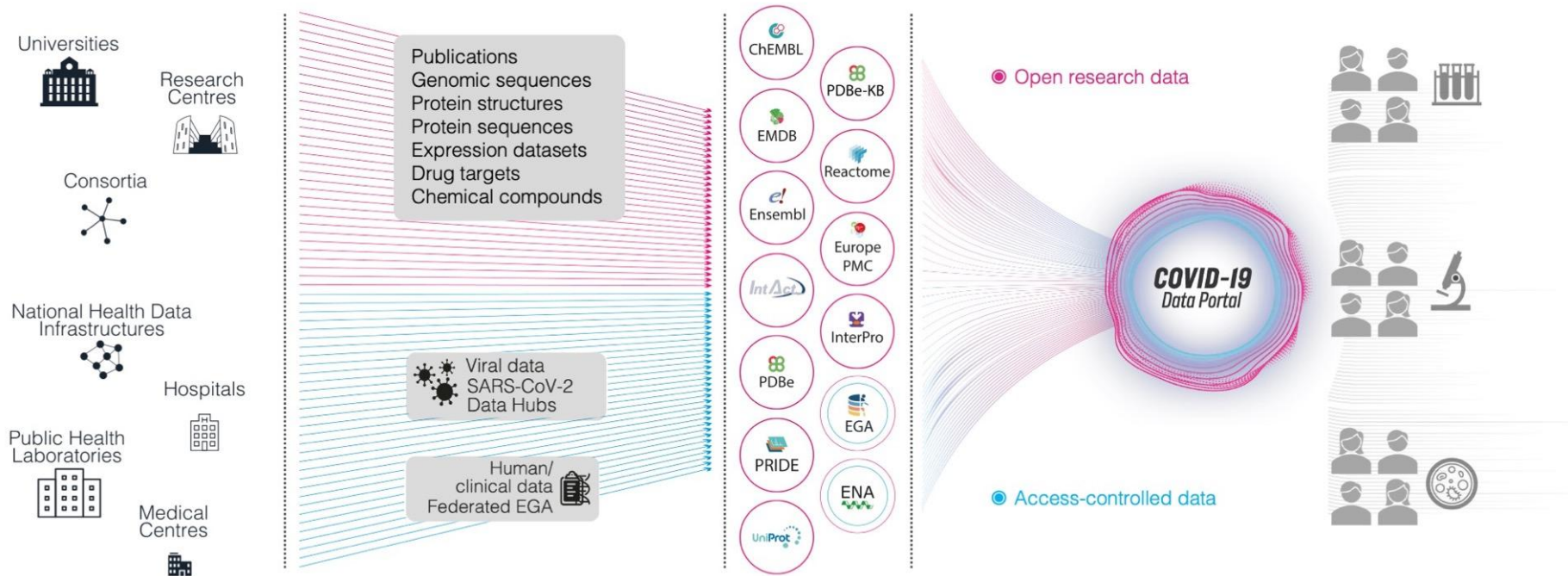
Packages

No packages published

Publish your first package

Contributors

Connected data resources



Data and metadata in context (I)



Study & data
design

Sampling
& specimen
collection

Sample
preparation

Sample analysis
& data generation

Data processing
to prepare inputs
for analysis

Data
analysis

Communicating
results

Procedures

data protection,
ethics permit,
infrastructure,
standards,
protocols,
data dictionaries,
data access, ...

Biosamples and instruments

populations (statistical) and inclusion criteria,
physical processing steps,
working storage conditions,
long-term storage location,
sample quality assessment,
sample annotations,
reagents, instruments, kits, ...

Data and computational workflows

digital processing steps,
working storage conditions,
long-term storage location,
data quality assessment,
sample/data annotations,
reference data,
analysis method...

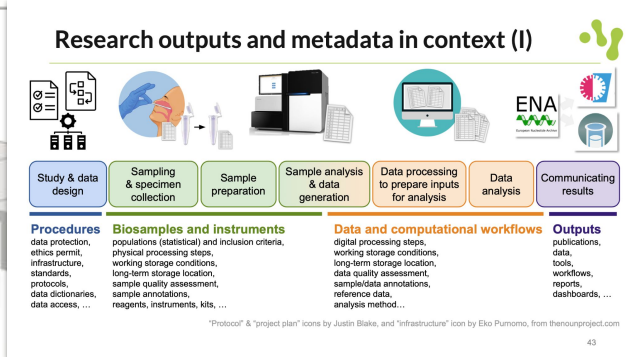
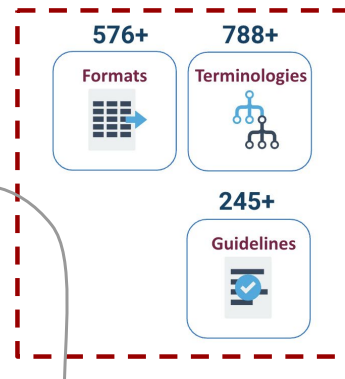
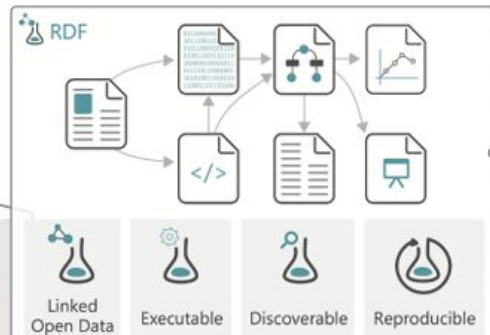
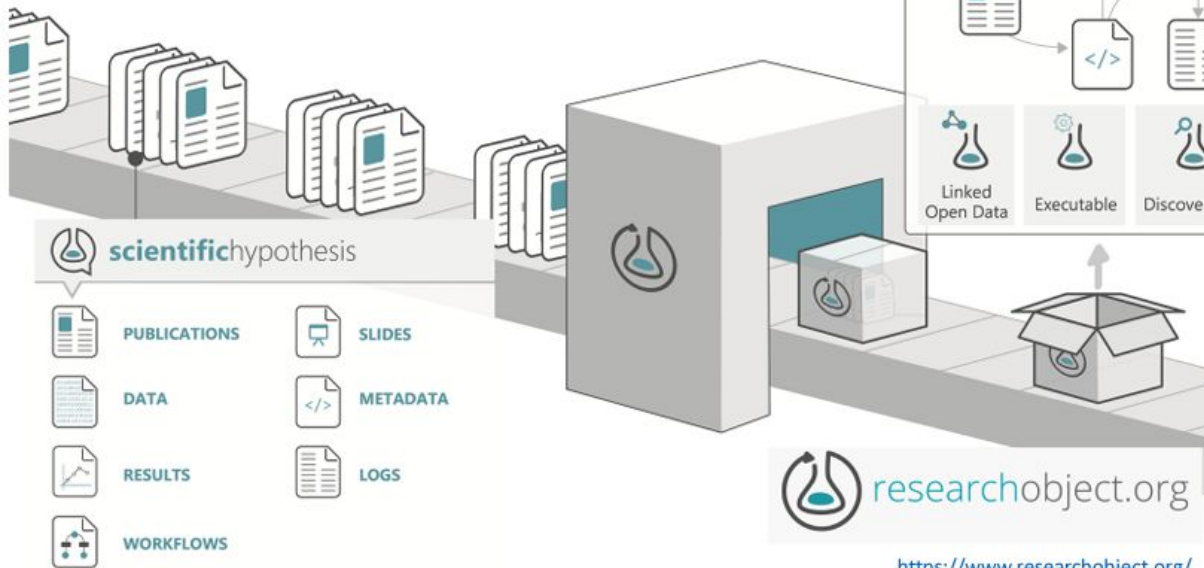
Outputs

publications,
data,
tools,
workflows,
reports,
dashboards, ...

“Protocol” & “project plan” icons by Justin Blake, and “infrastructure” icon by Eko Purnomo, from thenounproject.com

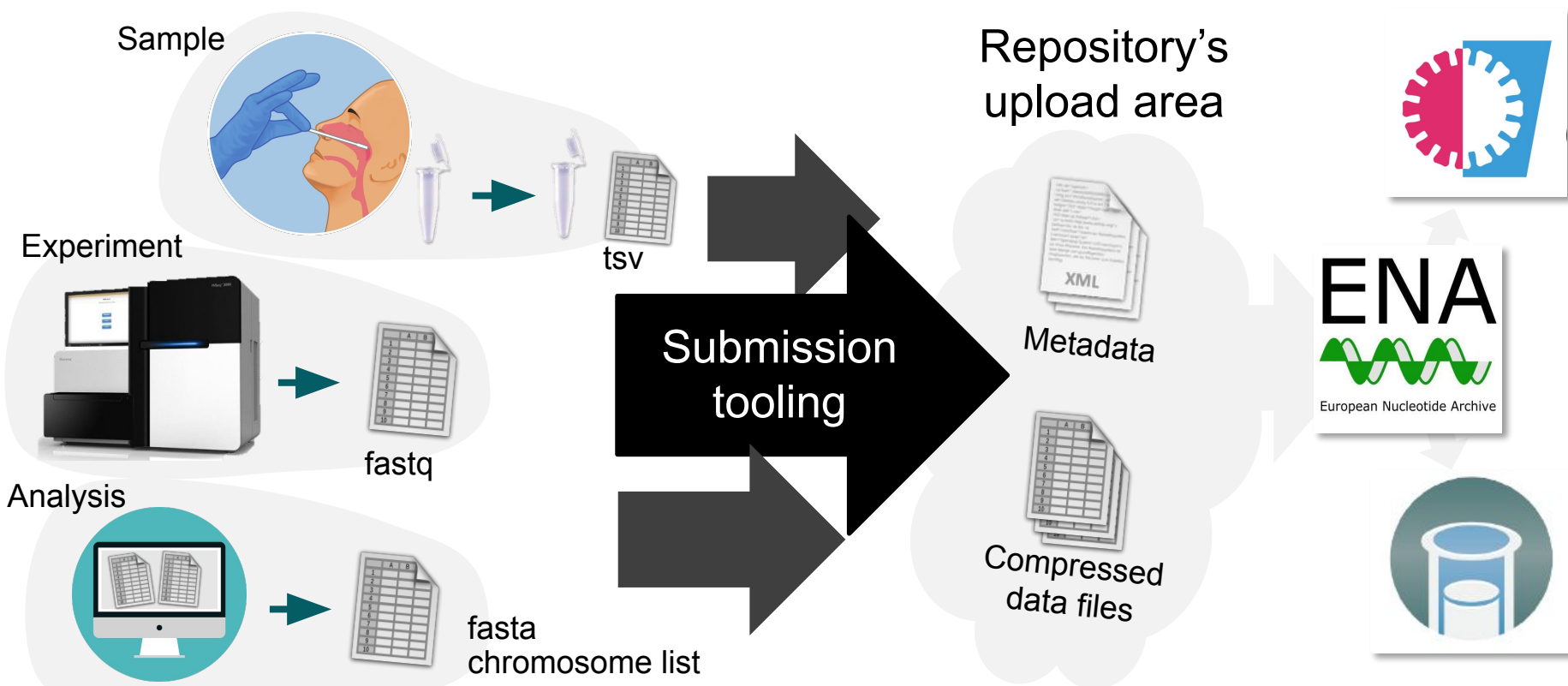
Data and metadata in context (II)

Enabling **reproducible**, transparent research.



*"Protocol" & "project plan" icons by Justin Blake, and "infrastructure" icon by Eiko Purnomo, from theonproject.com

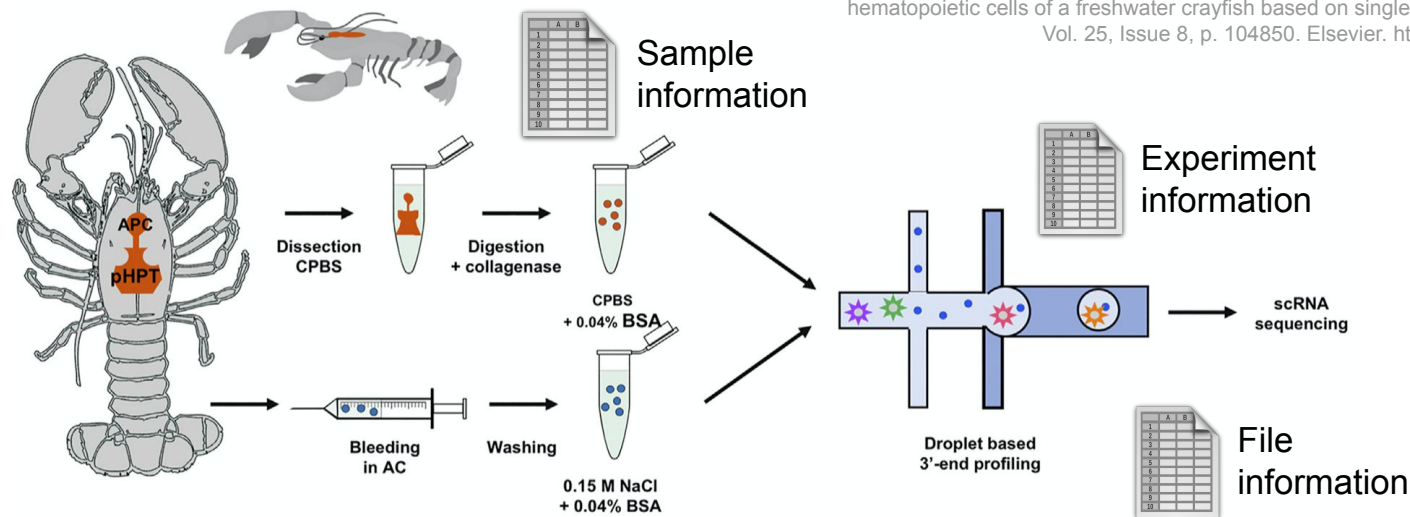
Depositing data to a repository



Single-cell RNA sequencing example

"Protocol" icon by Justin Blake from thenounproject.com

Söderhäll, I., Fasterius, E., Ekblom, C., & Söderhäll, K. (2022). Characterization of hemocytes and hematopoietic cells of a freshwater crayfish based on single-cell transcriptome analysis. In *iScience* Vol. 25, Issue 8, p. 104850. Elsevier. <https://doi.org/10.1016/j.isci.2022.104850>



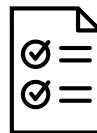
Sample collection protocol



Nucleic acid extraction protocol



Library construction protocol



Sequencing protocol

- checksums.md5
- SampleSheet.csv
- SI-GA-F2_1
 - TJ-2700-1_S1_L001_R1_001.fastq.gz
 - TJ-2700-1_S1_L001_R2_001.fastq.gz
 - TJ-2700-1_S1_L002_R1_001.fastq.gz
 - TJ-2700-1_S1_L002_R2_001.fastq.gz
- SI-GA-F2_2
 - TJ-2700-1_S2_L001_R1_001.fastq.gz
 - TJ-2700-1_S2_L001_R2_001.fastq.gz
 - TJ-2700-1_S2_L002_R1_001.fastq.gz
 - TJ-2700-1_S2_L002_R2_001.fastq.gz
- SI-GA-F2_3
 - TJ-2700-1_S3_L001_R1_001.fastq.gz
 - TJ-2700-1_S3_L001_R2_001.fastq.gz
 - TJ-2700-1_S3_L002_R1_001.fastq.gz
 - TJ-2700-1_S3_L002_R2_001.fastq.gz
- SI-GA-F2_4
 - TJ-2700-1_S4_L001_R1_001.fastq.gz
 - TJ-2700-1_S4_L001_R2_001.fastq.gz
 - TJ-2700-1_S4_L002_R1_001.fastq.gz
 - TJ-2700-1_S4_L002_R2_001.fastq.gz

Sample information as (meta)data

ENA Checklist: ERC00001 – ENA default sample checklist

OLS / Experimental Factor Ontology

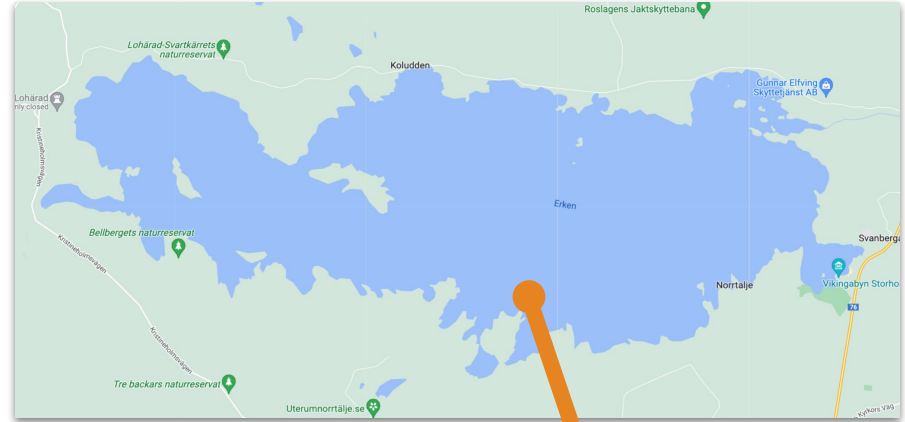
EFO

Population	Organism	<i>Pacifastacus leniusculus</i>
	Genotype	wild type genotype
	Geographical location	Sweden, Lake Erken
Individual	Growth condition	laboratory aquarium since Sep 2020
	Sampling date	020-11-06
	Developmental stage	adult
	Body weight	35
	Sex	male
Specimen	Organism part	hematopoietic system
Sample	Cell type	hemocyte

Sample collection protocols

Map data © Google. Crayfish derived from Illustration in Söderhäll et al. (2022).

- Obtain freshwater crayfish (adult males) from lake Erken, Sweden (59.8 N 18.6 E)
- Maintain in the crayfish facility in running tap water, 10-12°C, 12:12 light:dark cycle...
- Feed once a week

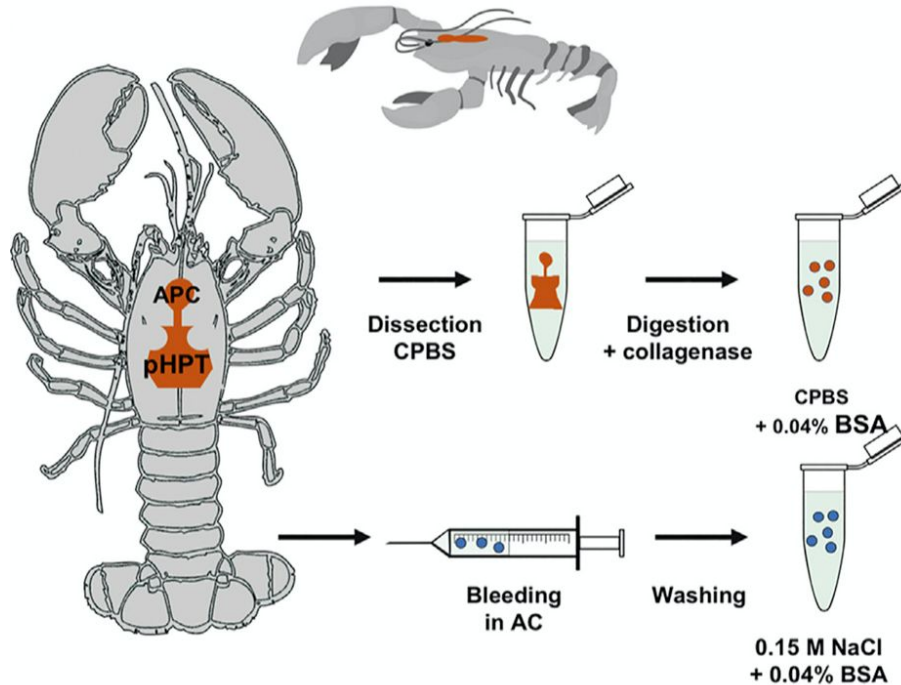


Map data © Google



Nucleic acid extraction protocol

Protocol illustration derived from Illustration in Söderhäll et al. (2022).

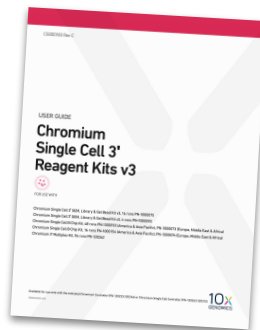


- Dissect and digest into single cells by incubation in 300 μ l of 0.1% collagenase ... at room temperature for 20 min on a rotating plate ... then filtered through a 40 mm cell strainer
- Pool isolated cells from four animals for scRNA-seq

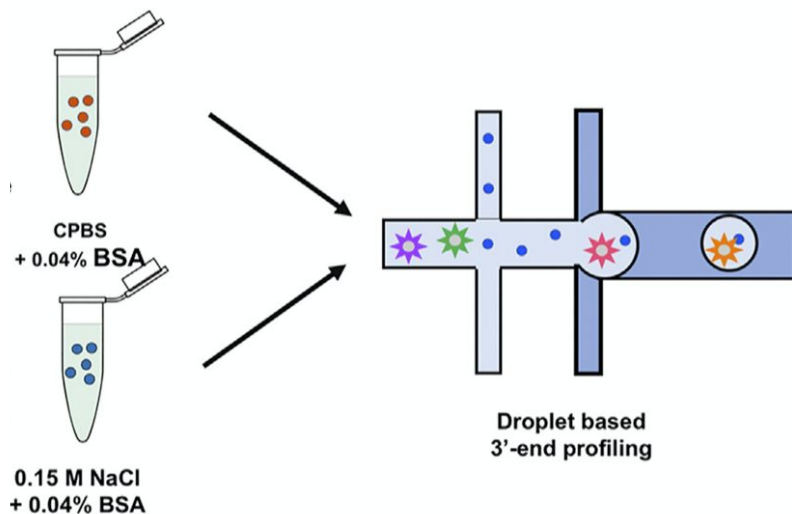
Library construction protocol

- Prepare sequencing libraries using Chromium Single Cell 3' reagent kit v3 (cat# 1000075/1000073/120262, 10xGenomics)
- According to the manufacturer's protocol

CG000183
Single Cell 3' Reagent Kit
User Guide, v3 chemistry,
10xGenomics



Protocol illustration derived from Illustration in Söderhäll et al. (2022).



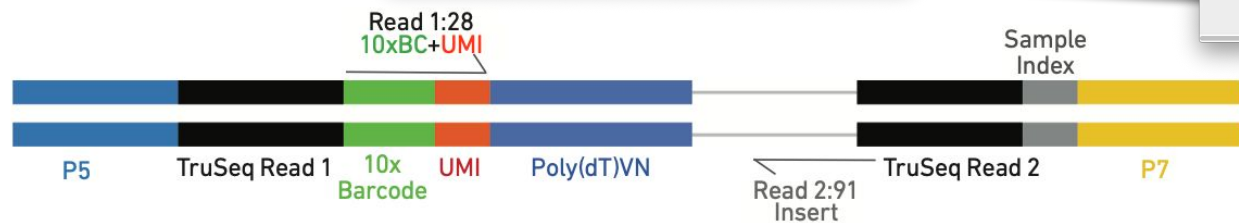
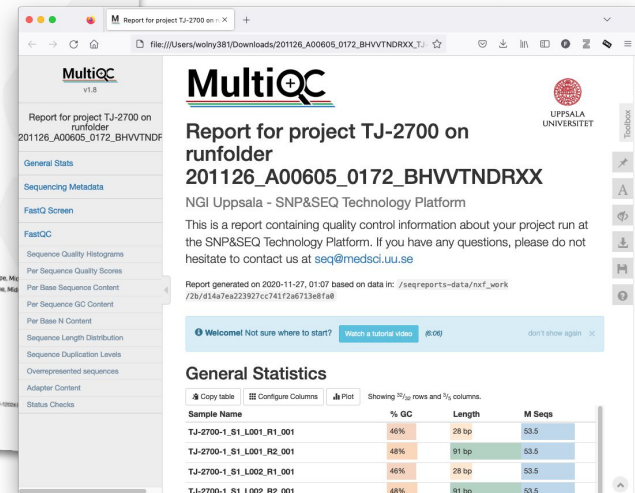
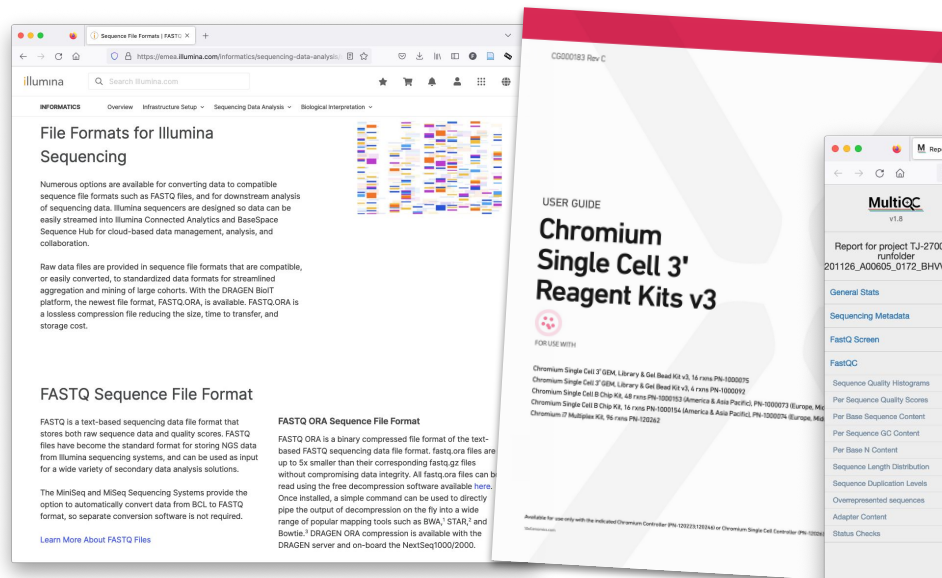
Sequencing protocol



- 28+8+0+91 bp read length
- NovaSeq 6000 system
- SP flowcell
- v1 sequencing chemistry
- Include a sequencing library for the phage PhiX as 1% spike-in in the sequencing run

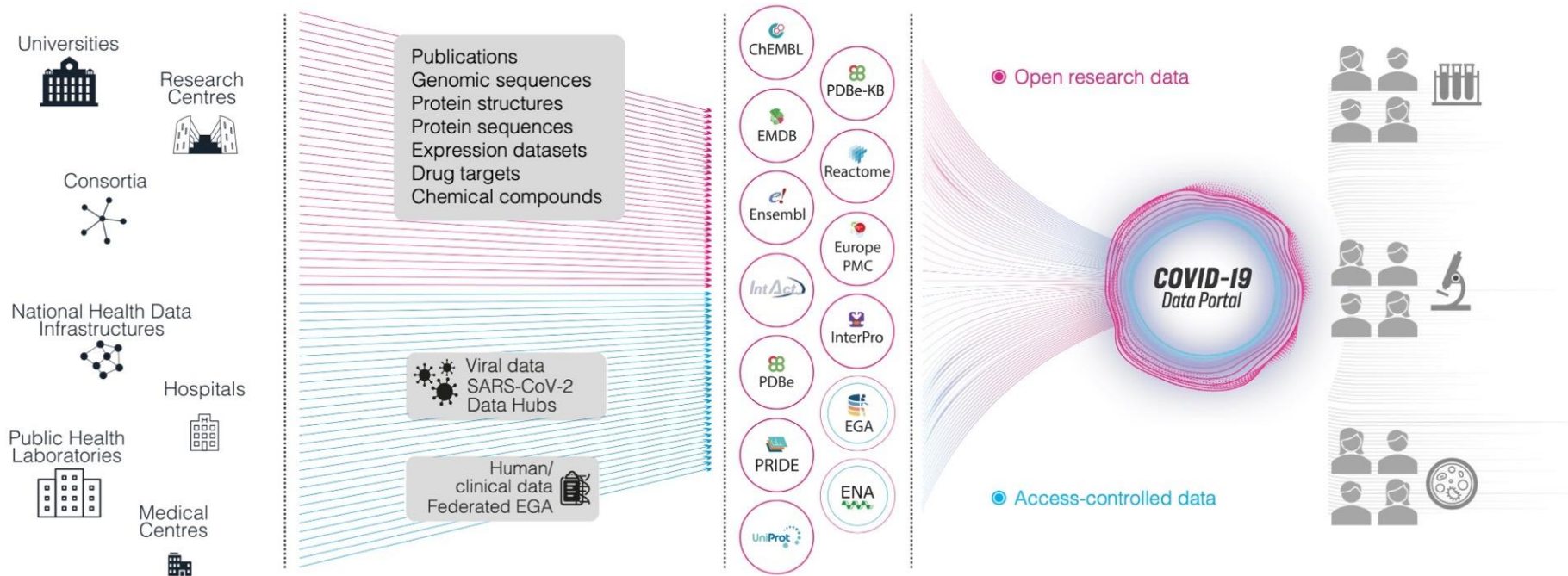
Files Delivered from Sequencing

- ▼ SI-GA-F2_1
 - TJ-2700-1_S1_L001_R1_001.fastq.gz
 - TJ-2700-1_S1_L001_R2_001.fastq.gz
 - TJ-2700-1_S1_L002_R1_001.fastq.gz
 - TJ-2700-1_S1_L002_R2_001.fastq.gz
- ▼ SI-GA-F2_2
 - TJ-2700-1_S2_L001_R1_001.fastq.gz
 - TJ-2700-1_S2_L001_R2_001.fastq.gz
 - TJ-2700-1_S2_L002_R1_001.fastq.gz
 - TJ-2700-1_S2_L002_R2_001.fastq.gz
- ▼ SI-GA-F2_3
 - TJ-2700-1_S3_L001_R1_001.fastq.gz
 - TJ-2700-1_S3_L001_R2_001.fastq.gz
 - TJ-2700-1_S3_L002_R1_001.fastq.gz
 - TJ-2700-1_S3_L002_R2_001.fastq.gz
- ▼ SI-GA-F2_4
 - TJ-2700-1_S4_L001_R1_001.fastq.gz
 - TJ-2700-1_S4_L001_R2_001.fastq.gz
 - TJ-2700-1_S4_L002_R1_001.fastq.gz
 - TJ-2700-1_S4_L002_R2_001.fastq.gz



- 201126_A00605_0172_BHVVNDRXX_TJ-2700_multiqc_report.html
- checksums.md5
- SampleSheet.csv

Connected data resources

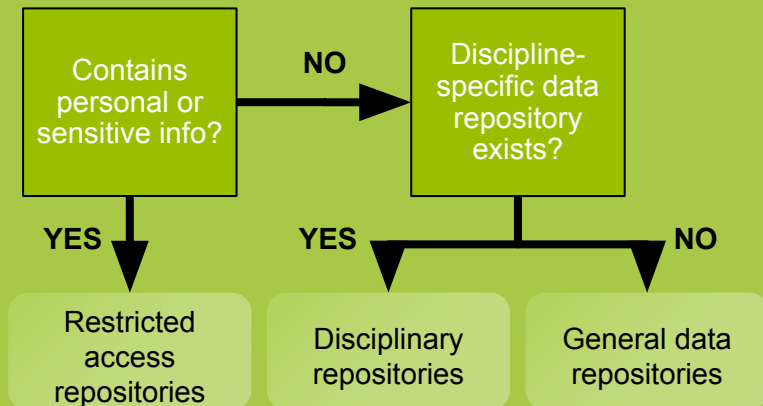


Data submission to public repositories

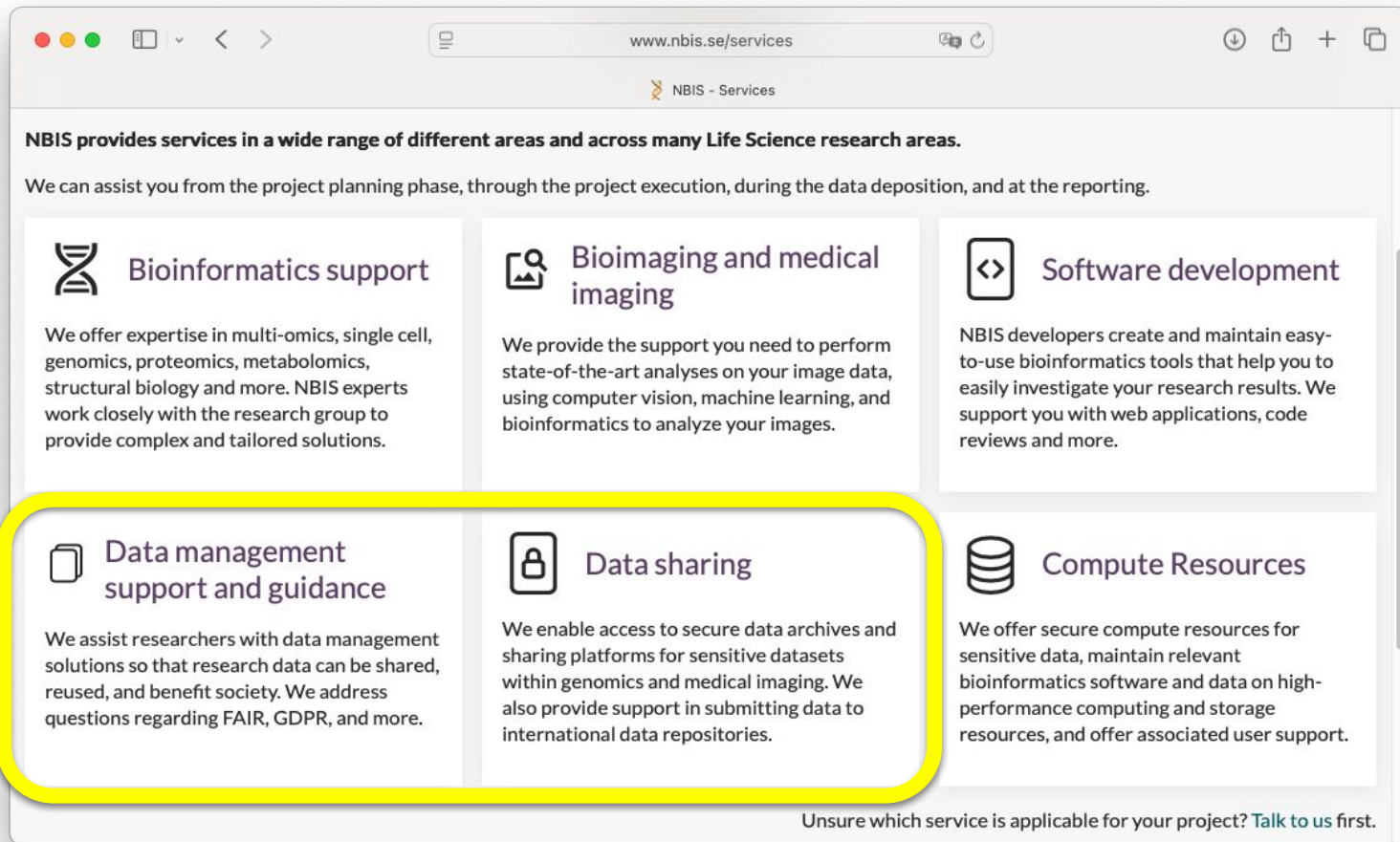
Making the data underlying your research publicly available to others is a fundamental part of a FAIR research process. When publicly available and appropriately described, data can be re-used by yourself as well as others. Domain-specific public repositories offer the most direct routes to making your data FAIR. This workshop will give you the why, where and how of data sharing via repository submission, including hands-on exercise. No prior knowledge is required in order to attend this workshop.

Learning outcomes:

- Know the benefits of data sharing
- Know how to find a suitable repository for different types of data
- Have experience of a repository submission



Services for Swedish Life Science Research



The screenshot shows a web browser window with the address bar displaying 'www.nbis.se/services'. The page title is 'NBIS - Services'. The main heading reads: 'NBIS provides services in a wide range of different areas and across many Life Science research areas.' Below this, a paragraph states: 'We can assist you from the project planning phase, through the project execution, during the data deposition, and at the reporting.' The page features six service cards arranged in a 2x3 grid. The first row includes 'Bioinformatics support', 'Bioimaging and medical imaging', and 'Software development'. The second row includes 'Data management support and guidance', 'Data sharing', and 'Compute Resources'. The 'Data management support and guidance' and 'Data sharing' cards are highlighted with a yellow border. At the bottom right, a text link says 'Unsure which service is applicable for your project? Talk to us first.'

Bioinformatics support

We offer expertise in multi-omics, single cell, genomics, proteomics, metabolomics, structural biology and more. NBIS experts work closely with the research group to provide complex and tailored solutions.

Bioimaging and medical imaging

We provide the support you need to perform state-of-the-art analyses on your image data, using computer vision, machine learning, and bioinformatics to analyze your images.

Software development

NBIS developers create and maintain easy-to-use bioinformatics tools that help you to easily investigate your research results. We support you with web applications, code reviews and more.

Data management support and guidance

We assist researchers with data management solutions so that research data can be shared, reused, and benefit society. We address questions regarding FAIR, GDPR, and more.

Data sharing

We enable access to secure data archives and sharing platforms for sensitive datasets within genomics and medical imaging. We also provide support in submitting data to international data repositories.

Compute Resources

We offer secure compute resources for sensitive data, maintain relevant bioinformatics software and data on high-performance computing and storage resources, and offer associated user support.

Unsure which service is applicable for your project? [Talk to us first.](#)

Services for Swedish Life Science Research

www.nbis.se/services/guidance-on-data-management

NBIS - Data management support and guidance

Data management support and guidance

We offer expertise in data management, policy documents and more.

Data management support

Our data stewards can guide you in creating data management plans, decide on storage solution, publishing your data, and more.

Data submission support

Get support with submitting your data to international repositories, such as the European Nucleotide Archive, ArrayExpress, Pride, etc.

Research Data Management guidelines

Written guidelines with the purpose to serve as an information resource to life science researchers in Sweden regarding research data management

AIDA Data Sharing Policy

Written guidelines and common practice in using and sharing clinical imaging data for research in Sweden and similar countries.

Guidance on working with human data

Written guidelines on working with and sharing research data derived from human subjects

Data management support and guidance

We assist researchers with data management solutions so that research data can be shared, reused, and benefit society. We address questions regarding FAIR, GDPR, and more.

data-guidelines.scilifelab.se/data-life-cycle/sharing/

Sharing phase | SciLifeLab Research Data Management Guidelines

SciLifeLab RDM Guidelines

Knowledge hub for the management of life science research data in Sweden

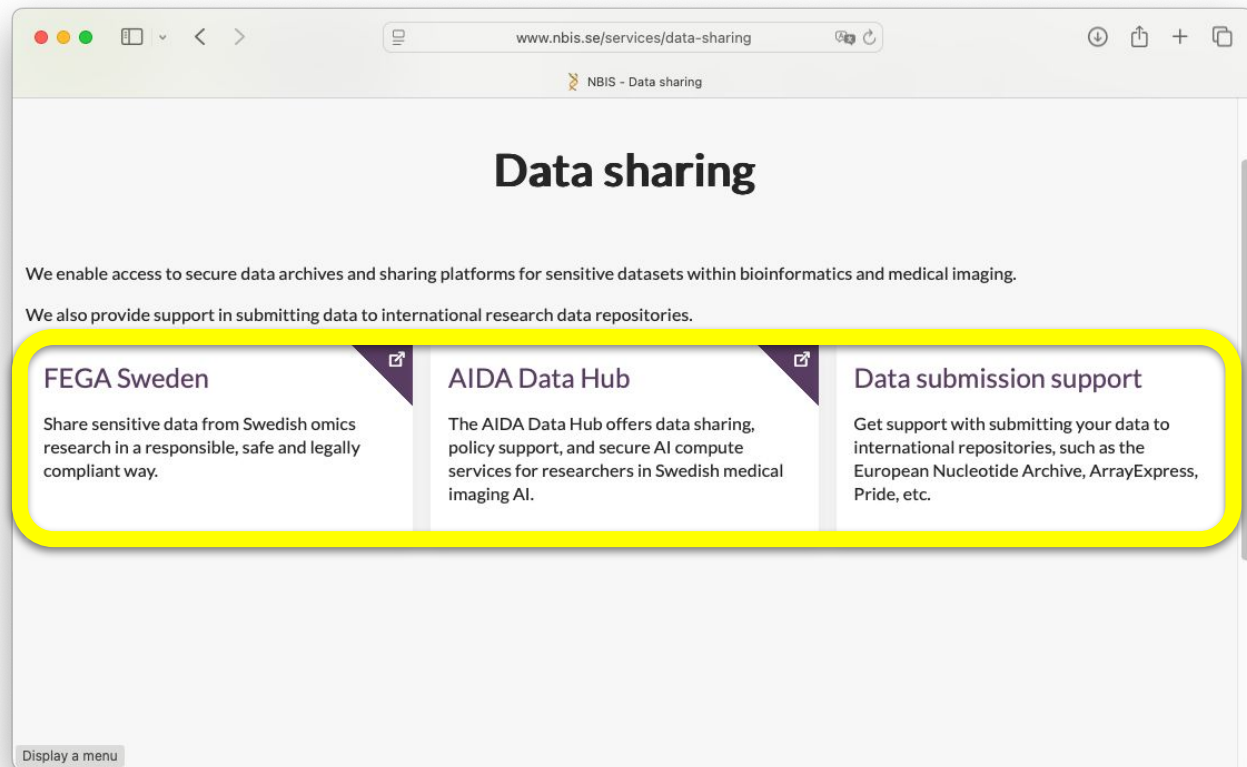
Home / Research data life cycle / Sharing phase

Finding a suitable repository type

Table of contents:

- Finding a suitable repository type
- Recommended discipline-specific repositories
 - Genomics data
 - Imaging data
 - Metabolomics data

Services for Swedish Life Science Research



Data sharing

We enable access to secure data archives and sharing platforms for sensitive datasets within genomics and medical imaging. We also provide support in submitting data to international data repositories.