



Publishing Shiny apps as a researcher

Webinar slides, 2025-01-16

DOI: <https://doi.org/10.17044/scilifelab.28204535>

Arnold Kochari (he/him)

Project lead at SciLifeLab & a big fan of Shiny



ORCID: <https://orcid.org/0000-0003-1373-5121>

Plan for today



Introduction

- Shiny apps in academic research
- Shiny hosting options

Demo: Shiny app hosting in practice with SciLifeLab Serve

- Step 1: Packaging a Shiny application (as a Docker image)
- Step 2: Making a packaged application available
- Step 3: Hosting an application on SciLifeLab Serve
- Done! 🎉

Meeting funder and institutional requirements

Q&A session



Part 1: Introduction

What is Shiny



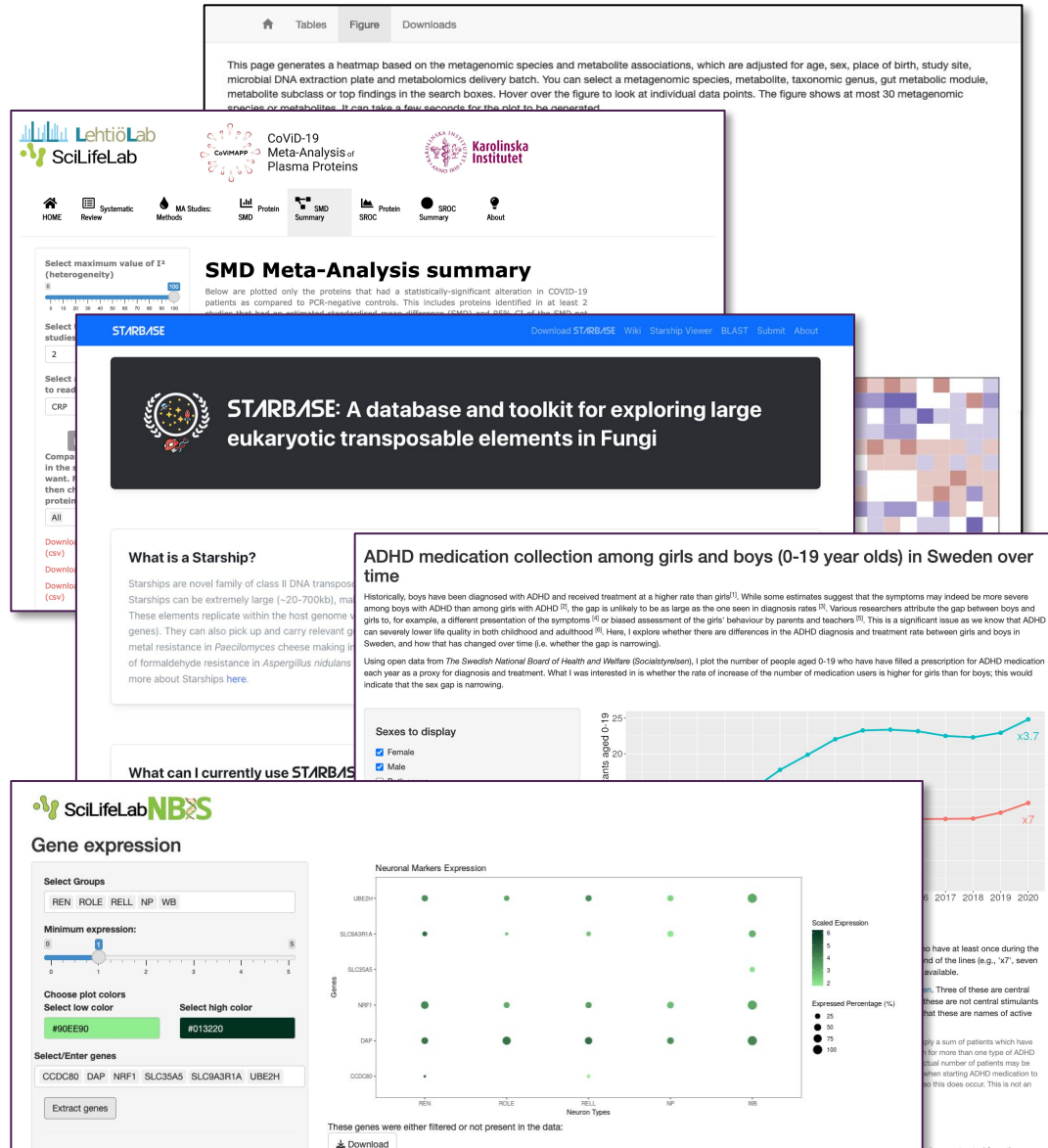
- Open source framework for creating interactive web applications using R code
- App can contain interactive visualisations, tables, text, images, etc.
- Easy to create:
 - no need for any knowledge of web development
 - any R code can run inside a Shiny app
 - lots of materials and help available online – e.g. <https://mastering-shiny.org/> (CC BY-NC-ND 4.0 license)
- Since 2022 there is also a *Python* version – completely separate but similar logic



Source:

<https://github.com/rstudio/hex-stickers>,
CC0-1.0 license

Why create Shiny applications



- Shiny is used across different industries for dashboards with visualisations, real-time statistics, reports, etc.
- Researchers typically create Shiny apps:
 - As supplementary materials for publications
- As a quick and easy graphical user interface to allow **collaborators to explore or annotate data**
- To **make analysis tools** that allow users to upload their own data and interact with it

Source: Screenshots of five different Shiny applications hosted on serve.scilifelab.se.



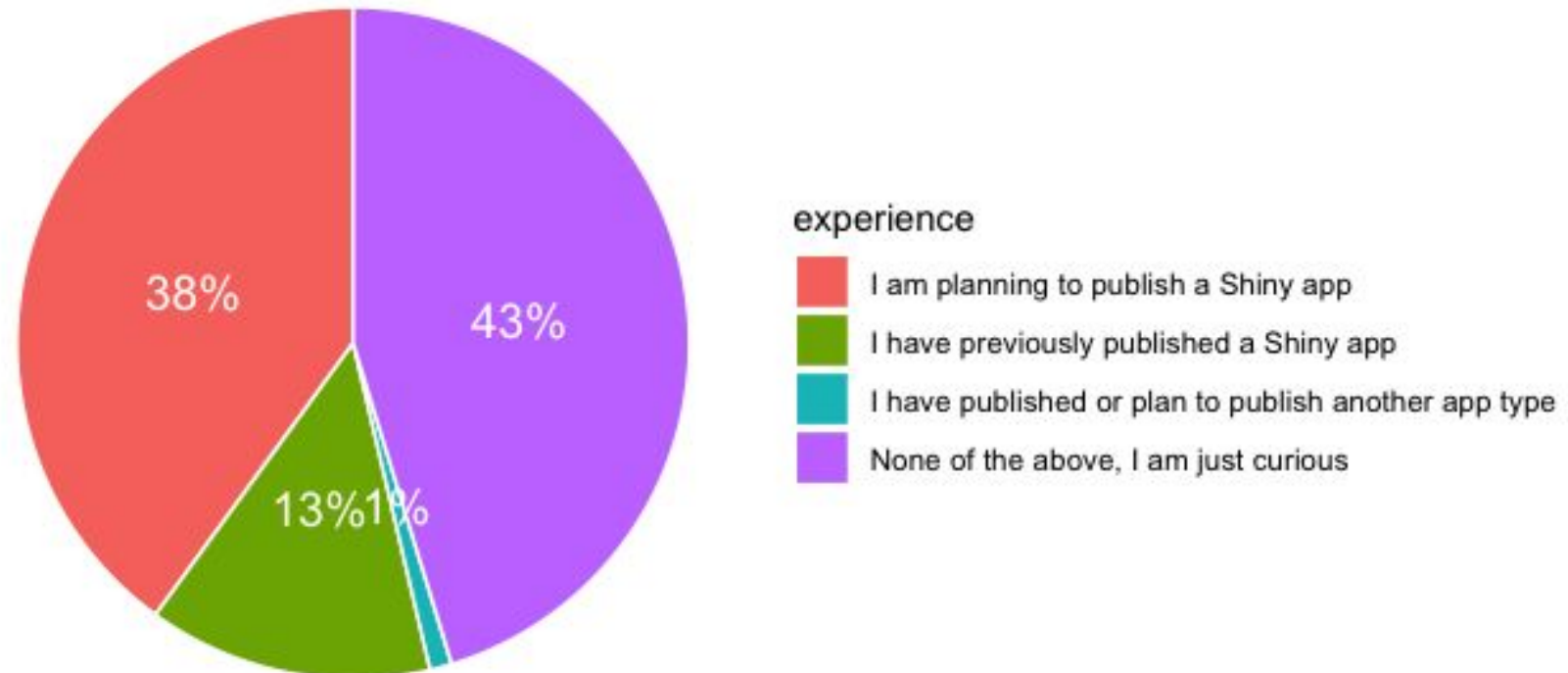
Part 2: Demo of Shiny app hosting

Your experience with publishing Shiny apps



Based on the answers in the registration form for this event

What is your experience with Shiny apps?



Shiny app hosting options

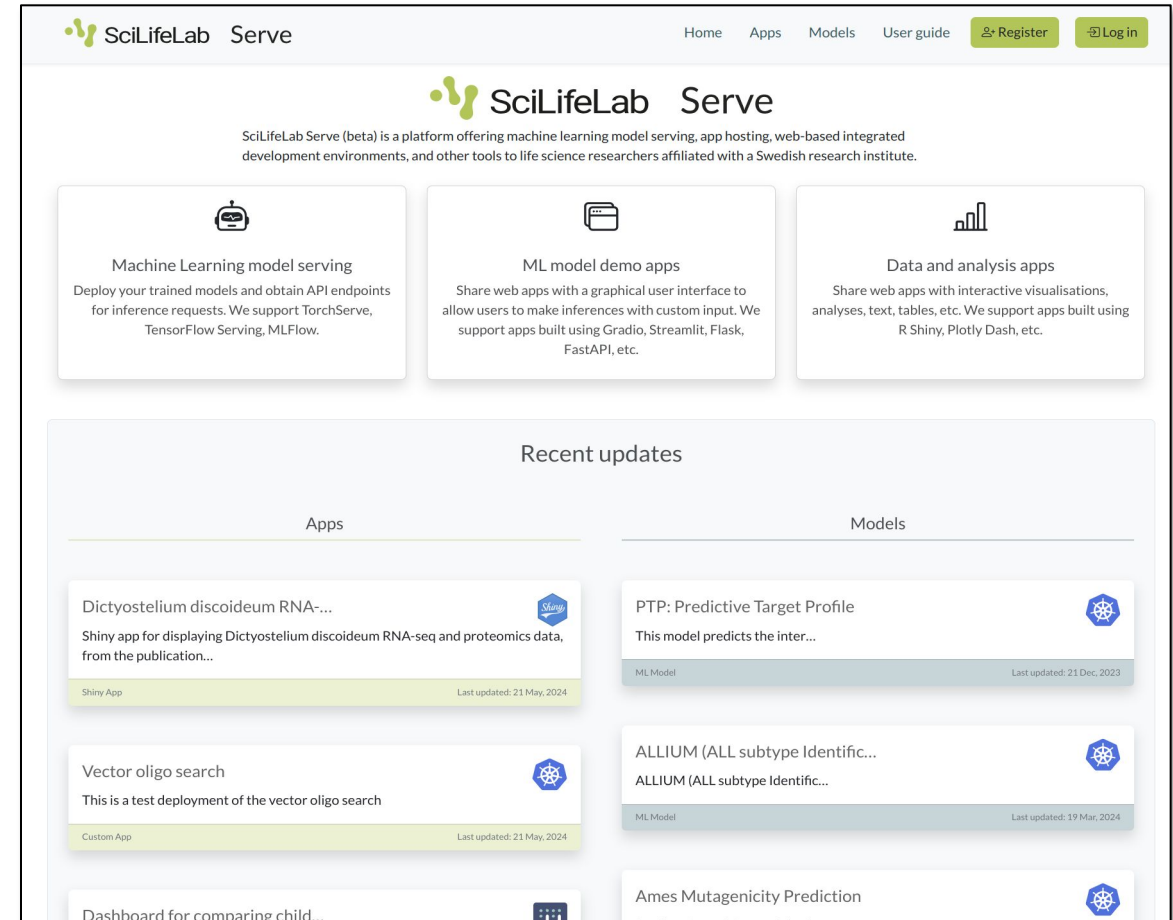


- Commercial offerings with basic free tier and paid versions for more hours/hardware:
 - shinyapps.io, huggingface.com
- Professional general hosting solutions
 - Digital Ocean, Heroku, AWS, Google Cloud, etc.
- **SciLifeLab Serve**
 - Tailored to the needs of life science researchers
 - Free of charge to all researchers in Sweden, incl. additional required hardware allocation
 - Easy to fulfil funder and institutional requirements

SciLifeLab Serve: serve.scilifelab.se

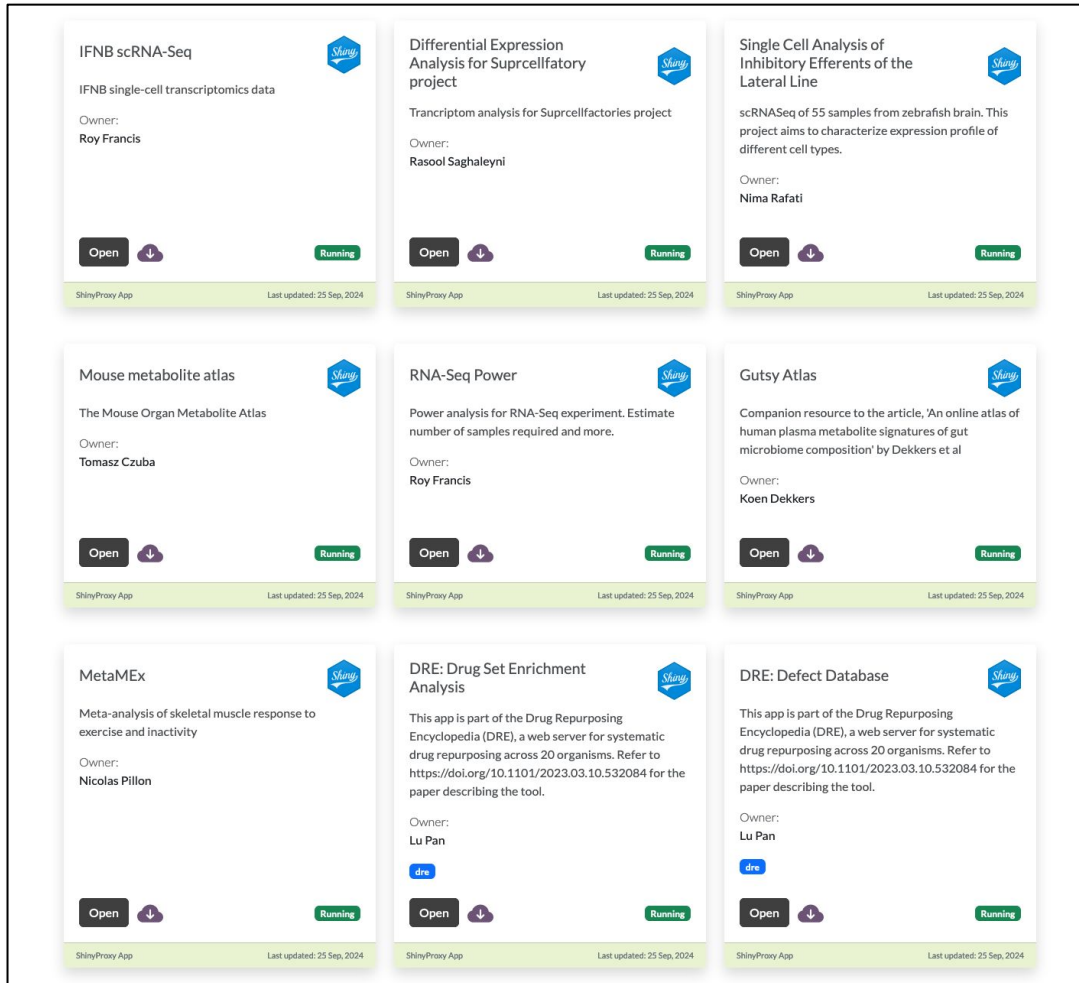


- Hosting of apps and trained ML models for scientists
- Available free of charge to all life science researchers affiliated with a Swedish research institution
- Currently ≈ 100 Shiny apps hosted on Serve
- Aim to be quick and easy; self-service
- In beta testing, open to all users. Stable service.



Source: Screenshot of <https://serve.scilifelab.se>

SciLifeLab Serve: serve.scilifelab.se



Source: Screenshot of <https://serve.scilifelab.se/apps>

- Swedish researchers can host applications which can then be used by everyone
- Default resources (more can be requested):
 - 2 vCPU, 4 GB RAM per user application
 - 1 GB data storage
- Own subdomain name:
my-app.serve.scilifelab.se
- Apps can stay private for a while
- Source code needs to be made publicly available



Packaging your Shiny app

- To be hosted on SciLifeLab Serve, a Shiny application needs to be packaged as a **Docker image**
 - *Docker* is a tool to package and deploy applications in portable lightweight containers.
 - Popular tool in industry, academia a bit behind.
- No need to learn Docker in detail for your Shiny app, simply use templates that we provide.
- Shiny application packaged as a Docker image can be hosted on any conventional hosting or run on local computers > *you, colleagues, readers of your articles, etc.*

Demo



GitHub workflow for apps that are updated often



Instead of building a Docker image manually you can rely on GitHub actions. This is an advanced topic described in our documentation.

<https://serve.scilifelab.se/docs/application-hosting/shiny/>

Complex apps with Shiny



- Be mindful of Shiny limitations if you are planning to build a serious tool.
 - great for applications with quick calculations
 - great for applications only reading data (especially where R is good)
 - great for quick app development
 - not optimal for long calculations
 - not optimal if data needs to be written into a database by the app
 - not as easy to test
 - etc...
- SciLifeLab Serve we can provide more hardware but it's not always going to help
- There are many tips on how to optimize a complex app (see our guide)
- Consider doing testing of your app (unit testing, load testing, integration testing; see our guide)

<https://serve.scilifelab.se/docs/application-hosting/shiny/>

Back to demo



More on Shiny at SciLifeLab Serve



**When you have a large dataset
you can upload it separately
from the Docker image**

**We do not accept apps with
sensitive data**

**Different users of your Shiny app will
not see each other's work/data**

**We do not currently keep track
of usage statistics**

**You can use your own custom
domain name for your app:
*example.com***



Part 3: Funder and institutional requirements

Shiny as research output



- Shiny apps produced by researchers are research output
 - just like traditional outputs like journal article, conference paper, book chapter and others like dataset, analysis code, software package, etc.



Shiny as research output



- Shiny apps produced by researchers are research output
 - just like traditional outputs like journal article, conference paper, book chapter and others like dataset, analysis code, software package, etc.
- Relevant guidelines from funders and institutions:
 - Ethical approval ^{1,2}
 - Open access publication ^{3,4}
 - Open data ^{4,5}
 - Open analysis workflows and code ⁶
 - Publication of research output according to FAIR principles ¹⁻⁶

1. Swedish Research Council, *Conducting ethical research*:
<https://www.vr.se/english/applying-for-funding/requirements-terms-and-conditions/conducting-ethical-research.html>
2. ERC, *Ethics guidance*: <https://erc.europa.eu/manage-your-project/ethics-guidance>
3. Swedish Research Council, *Publishing your research open access*:
<https://www.vr.se/english/mandates/open-science/open-access-to-scientific-publications/guidelines-for-publishing-with-open-access.html>
4. ERC, *Open Science* <https://erc.europa.eu/manage-your-project/open-science>
5. Swedish Research Council, *Open access to research data*
<https://www.vr.se/english/mandates/open-science/open-access-to-research-data/vision-and-guiding-principles.html>
6. National guidelines for promoting open science in Sweden
<https://www.kb.se/samverkan-och-utveckling/nytt-fran-kb/nyheter-samverkan-och-utveckling/2024-01-15-national-guidelines-for-promoting-open-science-in-sweden.html>

Shiny as research output



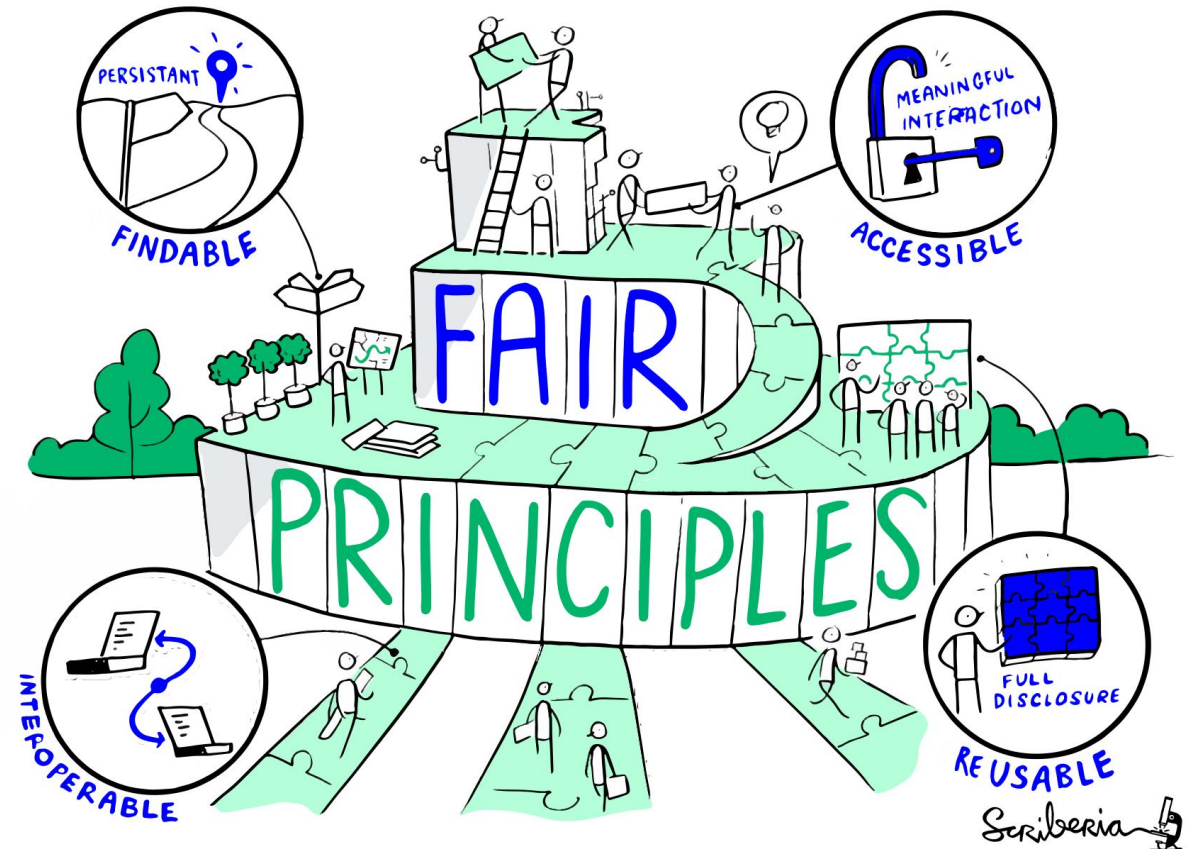
➡ That's why we are working on SciLifeLab Serve

FAIR principles



Set of principles originally written for research data¹ but since expanded to other research output^{2,3}.

1. Wilkinson, M., Dumontier, M., Aalbersberg, I. *et al.* The FAIR Guiding Principles for scientific data management and stewardship. *Sci Data* **3**, 160018 (2016). <https://doi.org/10.1038/sdata.2016.18>
2. Barker, M., Chue Hong, N.P., Katz, D.S. *et al.* Introducing the FAIR Principles for research software. *Sci Data* **9**, 622 (2022). <https://doi.org/10.1038/s41597-022-01710-x>
3. Patel, B., Soundarajan, S., Ménager, H. *et al.* Making Biomedical Research Software FAIR: Actionable Step-by-step Guidelines with a User-support Tool. *Sci Data* **10**, 557 (2023). <https://doi.org/10.1038/s41597-023-02463-x>



Source: Modified illustration by Scriberia for *The Turing Way* project.
CC-BY 4.0 licence. DOI: [10.5281/zenodo.3332807](https://doi.org/10.5281/zenodo.3332807)

Meeting FAIR requirements: code



In principle to get there 80% of the way:

Deposit a copy of your code to a repository that meets FAIR requirements.

In practice:



- GitHub or similar is great
- Though GitHub is not sufficient for FAIR
 - not an archival repository
 - does not provide a persistent identifier
- [Zenodo.org](https://zenodo.org) has a great integration with GitHub, you can get a DOI for each release (Figshare offers similar functionality).
- Provide the DOI or another persistent identifier when referring to the code.

zenodo Search records... Communities My dashboard Log in Sign up

Published January 10, 2025 | Version v1.1.0

ScilifelabDataCentre/shiny-adhd-medication-sweden: v1.1.0

Arnold Kochari ; Hamza ; Lars Gohr

ADHD medication collection among girls and boys (0-19 year olds) in Sweden over time

Version 1.1.0 now includes data up to 2023.

Dashboard plotting the number of people in Sweden aged 0-19 who have filled a prescription for ADHD medication each year between 2006 and 2023. The dashboard is based on open data from the *The Swedish National Board of Health and Welfare (Socialstyrelsen)*. Specifically, the data has been extracted from the *Statistikdatabas för läkemedel* where data about all medications that have been bought/given based on a prescription in Sweden since 2006 are available.

The live dashboard can be found here: adhd-medication-sweden.serve.scilifelab.se.

Files

ScilifelabDataCentre/shiny-adhd-medication-sweden-v1.1.0.zip

Files (137.7 kB)

Name	Size	Download all
ScilifelabDataCentre/shiny-adhd-medication-sweden-v1.1.0.zip	137.7 kB	Preview Download

2 VIEWS 0 DOWNLOADS

Versions

Version	Date
Version v1.1.0	Jan 10, 2025
Version v1.0.0	Jan 9, 2025

Cite all versions? You can cite all versions by using the DOI 10.5281/zenodo.14623624. This DOI represents all versions, and will always resolve to the latest one. [Read more.](#)

External resources

Available in

ScilifelabDataCentre/shiny-adhd-medication-sweden

Release: v1.1.0

Source: Screenshot of the Zenodo landing page for DOI [10.5281/zenodo.14623624](https://doi.org/10.5281/zenodo.14623624)

Meeting FAIR requirements: data



In principle, to get there 80% of the way:

Deposit a copy of your data to a repository that meets FAIR requirements.

In practice:

- Deposit the data even if you already make it available through your app.
- OR combine data and Shiny app code in a single entry in a general repository, e.g. Zenodo, Figshare.
- Provide DOI to your data inside your Shiny app.
- Ask for advice from your university data management team or from SciLifeLab/NBIS, available to everyone in Sweden:
<https://data-guidelines.scilifelab.se/>

SciLifeLab RDM Guidelines

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

Get support About Contact

Home Research data life cycle Topics Resources

The purpose of these guidelines is to serve as an information resource to life science researchers in Sweden regarding Research Data Management (RDM).

Research data life cycle

Click on a section of the wheel below to get an introduction to that phase of the research data life cycle, including information on relevant resources and training material.

RDMkit

RDM life cycle from RDMkit licensed under [Creative Commons Attribution 4.0 International License](#).

Topics

Click on either of the links below to get an overview of individual research data management topics.

Working with human data University RDM resources

Ask us anything

Do you have a question or need support with research data management?

We offer support to anyone involved in life science research that is affiliated with a Swedish university or research institute

[Go to support page](#)

Training resources

Find resources concerning data management in form of training, guidance and tools

[Go to resources page](#)

Need more?

For more data-driven resources visit the SciLifeLab Data Platform

SciLifeLab Data Platform

Source: Screenshot of <https://data-guidelines.scilifelab.se>

Thank you!



Get in touch with us: serve@scilifelab.se

Slides available here: bit.ly/shiny-webinar-slides

SciLifeLab Serve: serve.scilifelab.se

Thanks to the SciLifeLab Serve team and all researchers that use SciLifeLab Serve and give us valuable feedback!

DOI: <https://doi.org/10.17044/scilifelab.28204535>



Q&A