



# FAIRCOOKBOOK

**pharmas and academia join forces  
to make data FAIR**

ELIXIR

*Interoperability Platform Co-Lead*



**Susanna-Assunta Sansone**

ORCID: 0000-0001-5306-5690

Twitter: @SusannaASansone

*University of Oxford,*

*Professor of Data Readiness*



UNIVERSITY OF  
**OXFORD**



# FAIRCOOKBOOK

FAIRcookbook

## The FAIR Cookbook for FAIR doers

Authored by almost 100 data professionals from **industry** and **academia**, led by ELIXIR Nodes, with participation of USA NIH

Use  
it

Join  
it

Adopt  
it

FAIRcookbook

71

Recipes

91

Authors

22

Data Types

F Findability

EXEMPLAR RECIPES

- Unique, persistent identifiers
- Search engine optimization

LEARN MORE

A Accessibility

EXEMPLAR RECIPES

- Transferring data with SFTP
- Downloading data with Aspera

LEARN MORE

I Interoperability

EXEMPLAR RECIPES

- Selecting terminologies and ontologies
- Creating a metadata profile

LEARN MORE

R Reusability

EXEMPLAR RECIPES

- Data licenses
- Declaring data's permitted uses

LEARN MORE

Infrastructure



LEARN MORE

Assessments



LEARN MORE

Applied Examples



LEARN MORE

Maturity model



LEARN MORE

<https://faircookbook.elixir-europe.org>

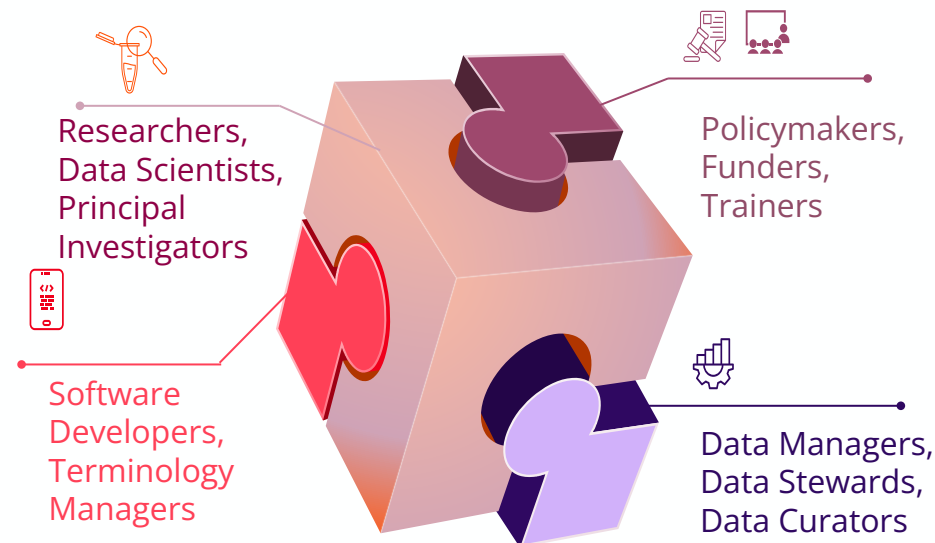
# What it is?

An online, **open** and **live** resource for the Life Sciences with recipes that help you to make and keep data Findable, Accessible, Interoperable and Reusable; in one word FAIR.

A collection of **recipes** that cover  
the operation steps of  
FAIR data management

# Who is it for?

- Introductory material
- Hands-on, technical step-by-step examples



- Practical examples to recommend in policies
- To use in educational material to incentivize and guide FAIR in practice.

- A venue to document and share existing and new approaches or services to support FAIRification
- A way to promote a participatory culture that enables sharing of expertise by getting exposure and credit

# Who developed it?

Almost 100 life sciences professionals, researchers and data managers

FARplus partners  
Industry + Academia























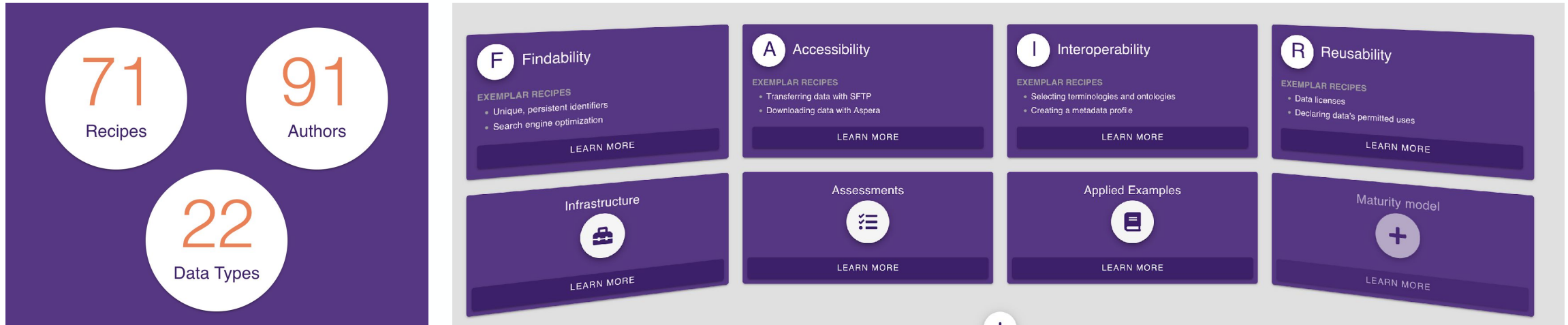
ELIXIR Nodes  
represented








# Coverage and learning objectives



- Over 70 recipes released and more content available
- Covering over 20 data types, incl:
  - omics
  - pre-clinical
  - clinical areas

But not limited to it!

- 1 Learn how to improve the FAIRness with **exemplar datasets**
- 2 Understand the levels and **indicators** of FAIRness
- 3 Discover **open source** technologies, tools and services
- 4 Find out the required **skills**
- 5 Acknowledge the **challenges**

# Search wizard to navigate recipes

## Search the cookbook recipes

**Filters:**

Search recipes names

---

Search recipes by type ▼

---

Search recipes by audience ▼

---

Reading Time

From 0 min To 60 min

Executable code

Yes Both No

Maturity Level

❌ RESET

Identifier	Recipe Name	Recipe Type	Reading Time	Executable Code	Audience	Maturity Level
FCB015	Downloading data with Aspera	Hands-on	15 min	✓	Principal Investigator, Data Manager, Data Scientist	<span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%;"></span>
FCB014	Transferring data with SFTP	Hands-on	15 min	✓	Principal Investigator, Data Manager, Data Scientist	<span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%;"></span>
FCB054	EHDEN OHDSI discovery with Schema.org	Experience Report / Applied Example	15 min	✗	Terminology Manager, Data Manager, Data Scientist, Ontologist	<span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%;"></span>
FCB042	eTox - omics datasets	Experience Report / Applied Example	20 min	✗	Data Manager, Data Curator, Ontologist	<span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%;"></span>
FCB067	FAIR High-Content Screening data deposition	Experience Report / Applied Example	15 min	✓	Data Manager	<span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%;"></span>
FCB037	Making omics data matrix FAIR	Hands-on	30 min	✓	Data Manager, Data Scientist	<span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%;"></span>
FCB038	FAIR Data Matrices	Hands-on	30 min	✓	Principal Investigator, Data Manager, Data Scientist	<span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%;"></span>
FCB039	Structuring data matrices	Hands-on	30 min	✓	Principal Investigator, Data Manager, Data Scientist	<span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%;"></span>
FCB040	Exploring data with SPARQL	Hands-on	30 min	✓	Principal Investigator, Data Manager, Data Scientist	<span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%;"></span>
FCB041	Integrating data	Hands-on	30 min	✓	Principal Investigator, Data Manager, Data Scientist	<span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%;"></span>
FCB062	FAIR Computational Workflows	Hands-on	15 min	✓	Principal Investigator, Data Manager, Data Scientist	<span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%;"></span>
FCB043	ND4BB - chemical activities datasets	Experience Report / Applied Example	20 min	✗	Data Manager, Data Curator	<span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; background-color: #e67e22; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%; margin-right: 5px;"></span> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid #ccc; border-radius: 50%;"></span>

<https://faircookbook.elixir-europe.org/content/search-wizard.html>



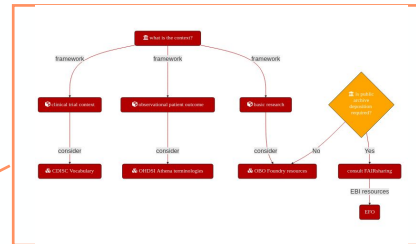




# Anatomy of a **recipe**: components

## Contents

- 7.1. Main Objectives
- 7.2. Graphical Overview
- 7.3. Capability & Maturity Table
- 7.4. FAIRification Objectives, Inputs and Outputs
- 7.5. Table of Data Standards
- 7.6. Ingredients
- 7.7. Step by step process
- 7.8. Conclusions
- 7.9. References
- 7.10. Supplementary material
- 7.11. Authors
- 7.12. License



## Ingredients

An idea of tools/skills needed

Tool Name	Tool Location	Tool function
ROBOT	<a href="http://robot.obolibrary.org/">http://robot.obolibrary.org/</a>	ontology management cli

## Step by step process

Guidelines, process, description

## Conclusions

What should I read next?

## Practical elements, code snippets

```
#Python3
#zooama-annotator-script.py
file
def
get_annotations(propertyType
, propertyValues, filters = ""): "
```

## Examples

- 7.12.1. Competency questions for the Ontology ROBOT use case
- 7.12.2. Application ontology for metabolomics

**RDMkit**

More about Identifiers from the RDM Toolkit

Pistoia Alliance

The Pistoia Alliance FAIRtoolkit use cases: Adoption and Impact of an identifier policy at Astra-Zeneca

# Links complementary resources

## Contents

- 7.1. Main Objectives
- 7.2. Graphical Overview
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- 7.4. FAIRification Objectives, Inputs and Outputs
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- 7.8. Conclusions
- 7.9. References
- 7.10. Supplementary material
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Current links with and references to:



**RDMkit**





More about Identifiers from the RDM Toolkit

Pistoia Alliance




The Pistoia Alliance FAIRtoolkit use cases: Adoption and Impact of an identifier policy at Astra-Zeneca

# Credit and citability: because all contributions matters!

Recipe Overview

-  Reading Time  
30 minutes
-  Executable Code  
No
-  Difficulty  


## Unique, persistent identifiers

-  Recipe Type  
Background information
-  Audience  
Principal Investigator, Data Manager, Data Scientist
-  Maturity Level & Indicator  
[F+MM-1.1C] [F+MM-1.2C]




















Cite me with FCB006

[w3id.org/faircookbook/FCB006](https://w3id.org/faircookbook/FCB006)



CreDiT  
attribution ontology

CRT

Name	Orcid	Affiliation	Type	Elixir Node	Credit Role
 Andrea Splendiani		Novartis AG			Conceptualization
 Alasdair J G Gray		Heriot Watt University			Writing - Original Draft
 Chris Evelo		University of Maastricht			Writing - Original Draft
 Egon Willighagen		University of Maastricht			Writing - Original Draft
 Philippe Rocca-Serra		University of Oxford			Writing - Review & Editing, Conceptualization











# FAIRCOOKBOOK

Internationally sustained and adopted

October 7, 2022

Preprint Open Access

## The FAIR Cookbook - the essential resource for and by FAIR doers

 Philippe Rocca-Serra;  Wei Gu;  Vassilios Ioannidis;  Tooba Abbassi Daloi;  Salvador Capella-Gutierrez;  Ishwar Chandramouliswaran;  Andrea Splendiani;  Tony Burdett;  Robert T. Giessmann;  David Henderson;  Dominique Batista;  Allyson Lister;  Ibrahim Emam;  Yojana Gadiya;  Lucas Giovanni;  Egon Willighagen;  Chris Evelo;  Alasdair J. G. Gray;  Philip Gribbon;  Nick Juty;  Danielle Welter;  Karsten Quast;  Paul Peeters;  Herman van Vlijmen;  Tom Plasterer;  Dorothy Reilly;  Eelke van der Horst;  Susanna-Assunta Sansone; the FAIR Cookbook Recipes' Authors



[faircookbook.elixir-europe.org](https://faircookbook.elixir-europe.org)

[fairplus-cookbook@elixir-europe.org](mailto:fairplus-cookbook@elixir-europe.org)

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