

The Alan Turing Institute

Open science for enabling reproducible,
ethical and collaborative research:

Insights from The Turing Way

Malvika Sharan & Emma Karoune

Pronouns: she/her



Shared spaces create shared experiences



Where You Are Is Who You Are? The Geographical Account of Psychological Phenomena. *Frontiers in Psychology*, doi: 10.3389/fpsyg.2020.00536, Image: FES | Foundation for Ecological Security. Annual Report 2019-2020, Picture by Dilip Kumar Champi

Shared spaces create shared experiences

Commons (*noun*)



Shared spaces create shared experiences

Commons (*noun*)

Land or resources belonging to or affecting the whole of a community.



Basu, S., Jongerden, J., & Ruivenkamp, G. (2017). Development of the drought tolerant variety Sahbhagi Dhan: exploring the concepts commons and community building. *International Journal of the Commons*, 11(1). doi: 10.18352/ijc.673, FES | Foundation for Ecological Security. Annual Report 2019-2020, Picture by Dilip Kumar Champi, <https://fes.org.in>

Participatory processes to manage the Commons



<https://www.in-common.co.uk/2021/06/09/our-wonderful-southampton-common/>

Governing the Commons: Elinor Ostrom



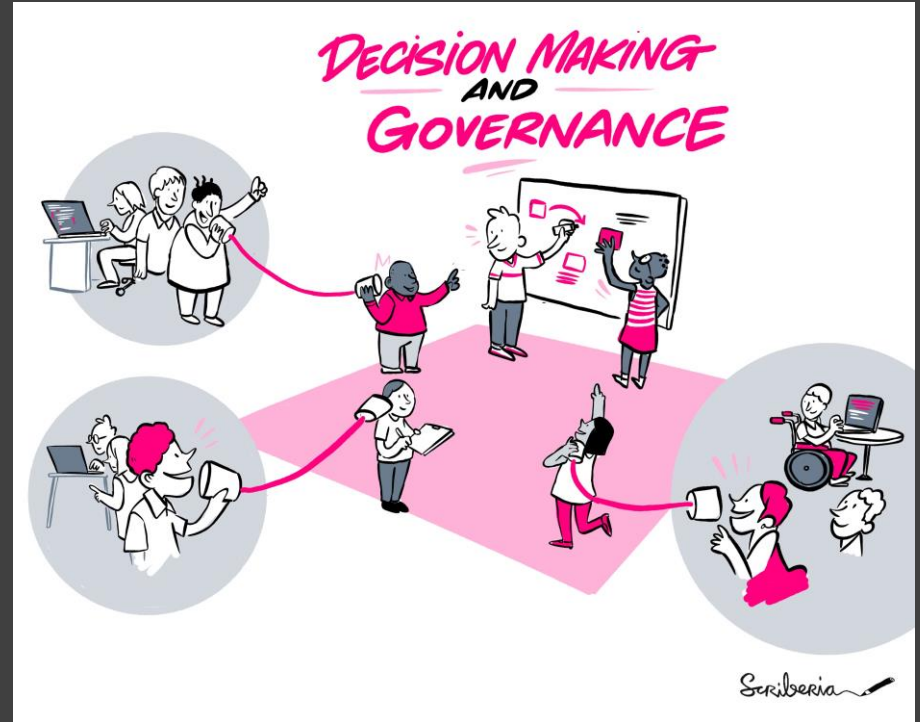
Extensively researched communities and provided principles for how commons can be governed equitably and sustainably – debunking “Tragedy of the Commons”.

2009 Nobel Laureate

(1933-2012)

Collective benefits

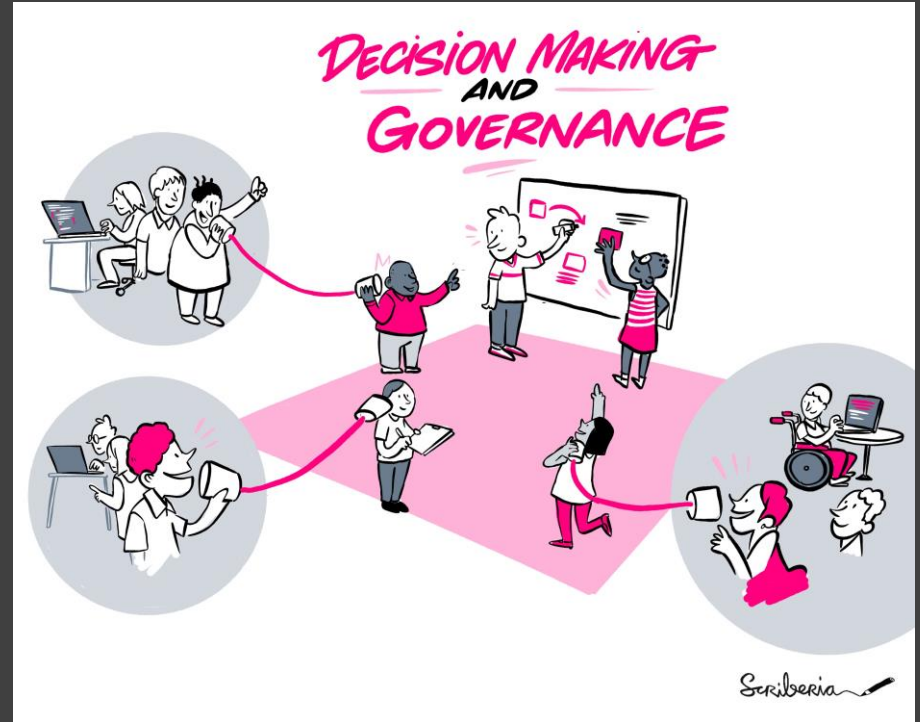
Digital Commons include free and open source software, open access journals, community-led projects and platforms – part of **Open Science**.



Collective benefits

You are already practicing openness.

Open Science as a common language merely validates what others may consider marginal or inconsequential.



Open Science

Everyone can **freely access**,
reuse, **reproduce**, **build upon** and
distribute research objects.



Kelly, Anthony, "With Head, Heart and Hand: Dimensions of Community Building" (Boolarong Press) ISBN 978-0-86439-076-9,
Wenger, McDermott, Snyder, A Guide to Managing Knowledge: Cultivating Communities of Practice. HBS (2002)

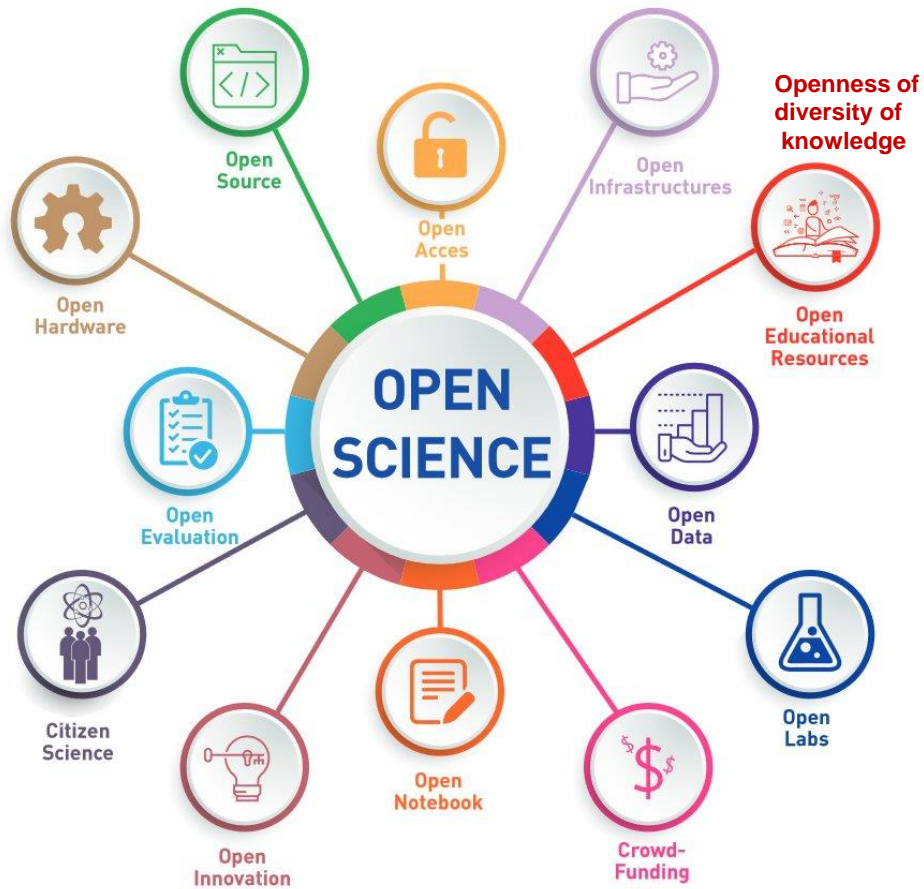
@malvikasharan, @ekaroune, @turingway, Image by Scriberia for The Turing Way , CC-BY 4.0, Zenodo: zenodo.org/record/6737966

Open Science

Everyone can **freely access, reuse, reproduce, build upon and distribute** research objects.

Community framework for **collaboration, peer production and sustainability.**





UNESCO regards science as a human right -- the greatest collective endeavour -- that has significant value as a common good.



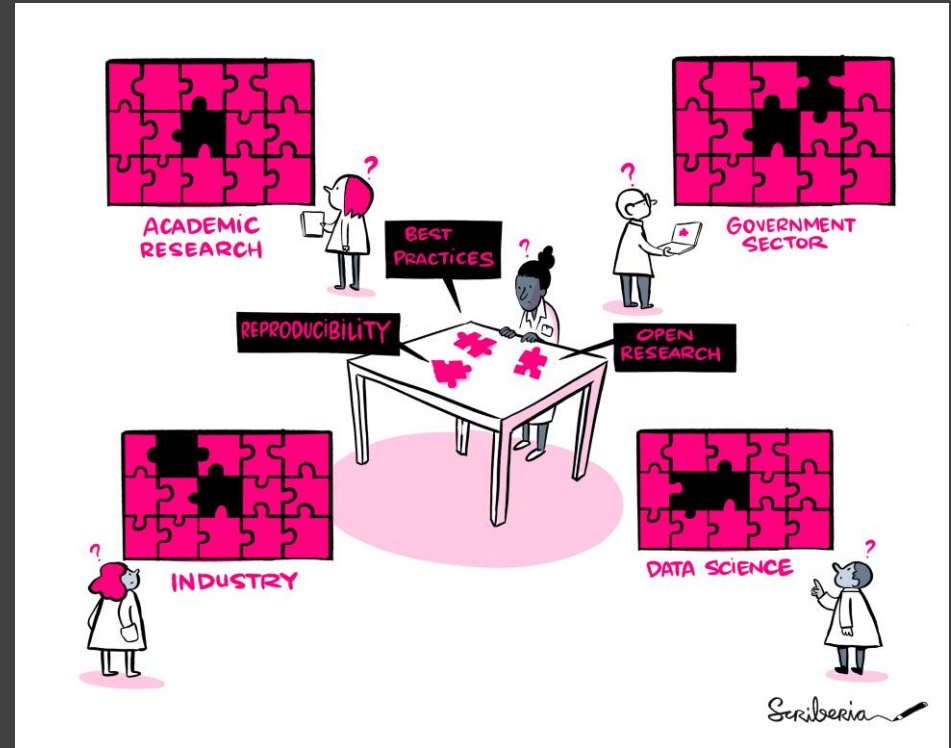
UNESCO regards science as a human right -- the greatest collective endeavour -- that has significant value as a common good.

... aims to turn right to Open Science into duty to be exercised by researchers, institutions, educators, publishers, employers, libraries, and policymakers, facilitated by Member States.

Integrating open science

Open Science means different things in different contexts, and hence, there is no fixed “best practice”.

Many barriers to openness.



Ten arguments against Open Science that you can win. (2022, May 26). <https://www.software.ac.uk/blog/2020-12-17-ten-arguments-against-open-science-you-can-win>, @malvikasharan, @ekaroune, @turingway, Image by Scriberia for The Turing Way, CC-BY 4.0,

Zenodo: zenodo.org/record/6737966

The Turing Way

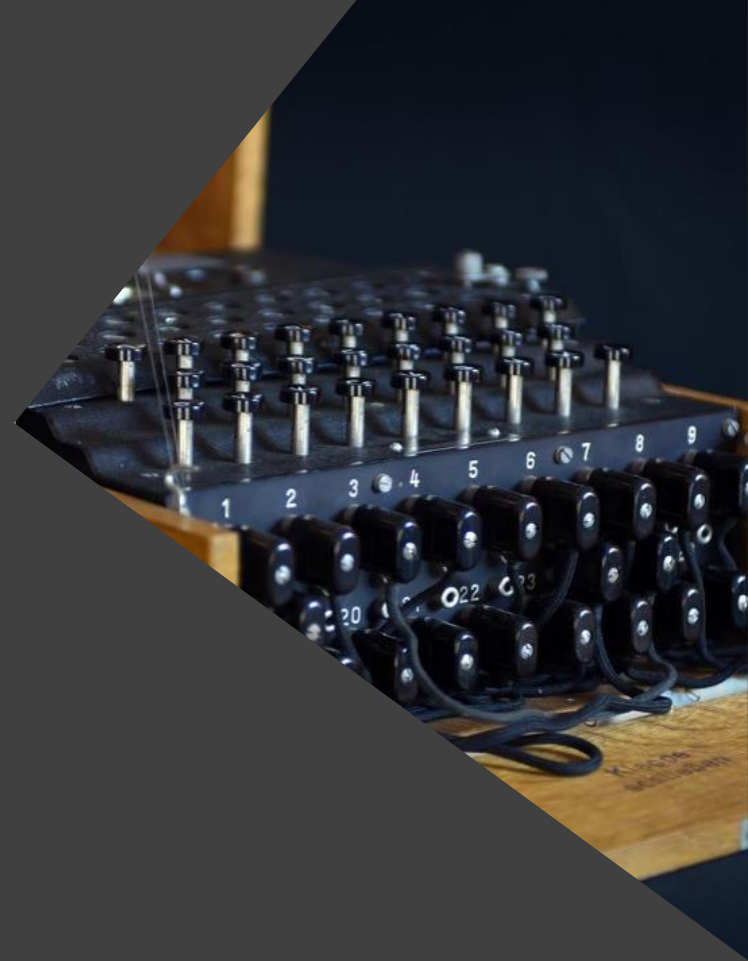
An Open Science and community lead guide on Data Science.

We involve and support a **diverse community** to make research **reproducible, ethical, and collaborative** for everyone.



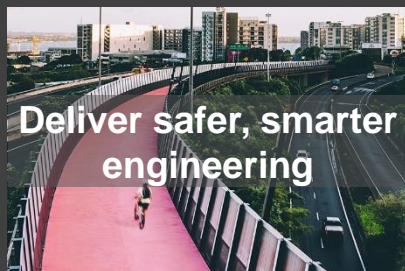
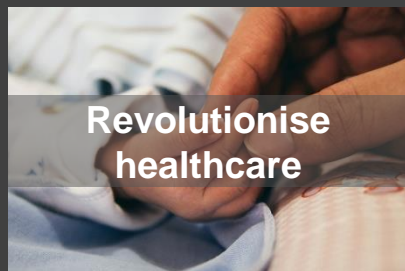
The Alan Turing Institute

The national institute
for data science and
artificial intelligence



Challenges

Advance data science and artificial intelligence to...



Tools, Practices and Systems

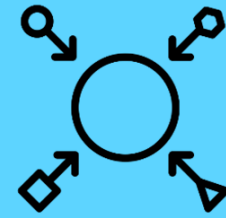
- Trustworthy systems
- Transparent reporting
- Inclusive interoperable design
- Ethical integrity
- Respectful co-creation
- Leadership in open research



Trust



Transparency



Inclusivity



Integrity



Respect



Leadership

The Turing Way: Book on Reproducibility



Kirstie Whitaker

Director: Tools,
Practices & Systems
Programme (TPS)

“We need to share the responsibility for open and reproducible science. That – along with good collaboration, communication and ethics – should be seen as fundamental to the scientific method.”

@malvikasharan, @ekaroune, @turingway, Image by Scriberia for The Turing Way, CC-BY 4.0, Zenodo: <https://zenodo.org/record/6737966>

The Turing Way is a lightly opinionated guide to reproducible data science.

Our goal is to provide all the information that researchers need at the start of their projects to ensure that they are easy to reproduce at the end.

This also means making sure PhD students, postdocs, PIs, and funding teams know which parts of the "responsibility of reproducibility" they can affect, and what they should do to nudge data science to being more efficient, effective, and understandable.



The Turing Way: Book on Reproducibility



Kirstie Whitaker

Director: Tools,
Practices & Systems
Programme (TPS)



Malvika Sharan

TPS Senior
Researcher: Open
Research & Community



Anne Lee Steele

Community Manager,
The Turing Way

@malvikasharan, @ekaroune, @turingway, Image by Scriberia for The Turing Way, CC-BY 4.0, Zenodo: <https://zenodo.org/record/6737966>

The Turing Way is a lightly opinionated guide to reproducible data science.

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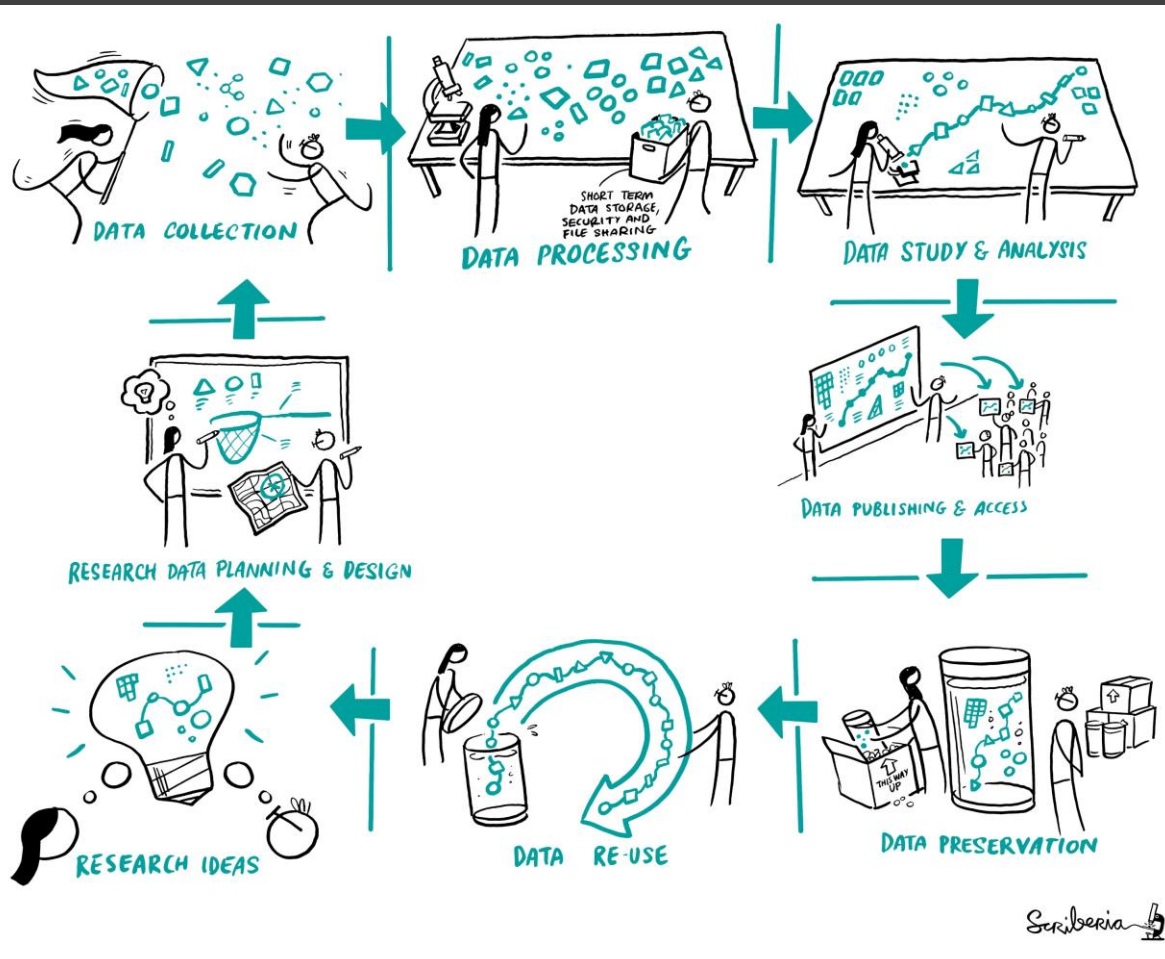


Reproducibility

		Data	
		Same	Different
Analysis	Same	Reproducible	Replicable
	Different	Robust	Generalisable

Reproducibility

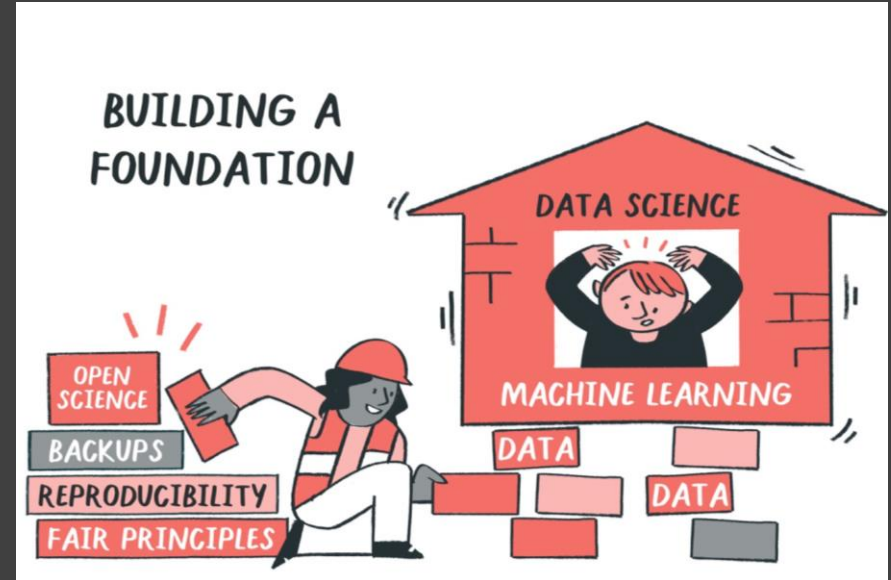
		Data	
		Same	Different
Analysis	Same	Reproducible	Replicable
	Different	Robust	Generalisable



Scriberia

Foundational skill-set

Purpose of openness is to ensure **scientific integrity and quality outcomes**, achieved by applying **reproducible, ethical, collaborative and inclusive** research practices.



Guide for Reproducible Research

Overview

Open Research

Version Control

Licensing

Research Data Management

Reproducible Environments

BinderHub

Code quality

Code Testing

Code Reviewing Process

Reusable Code

Continuous Integration (CI)

Reproducible Research with

Make

Research Compendia



Fig. 3 The Turing Way project illustration by Scriberia. Used under a CC-BY 4.0 licence. DOI: [10.5281/zenodo.3332807](https://doi.org/10.5281/zenodo.3332807).

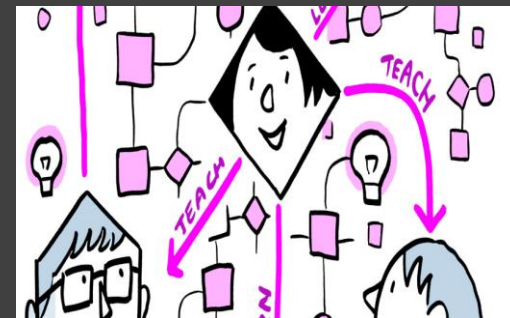
The Turing Way Guides



Reproducibility



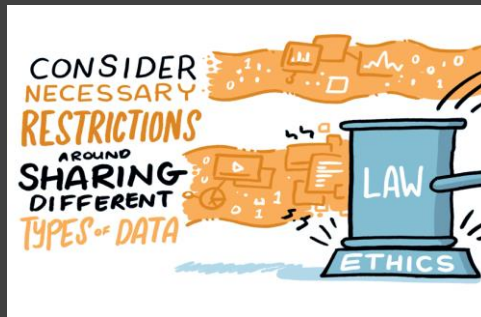
Project Design



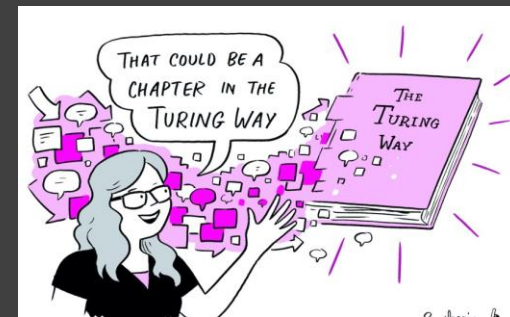
Communication



Collaboration

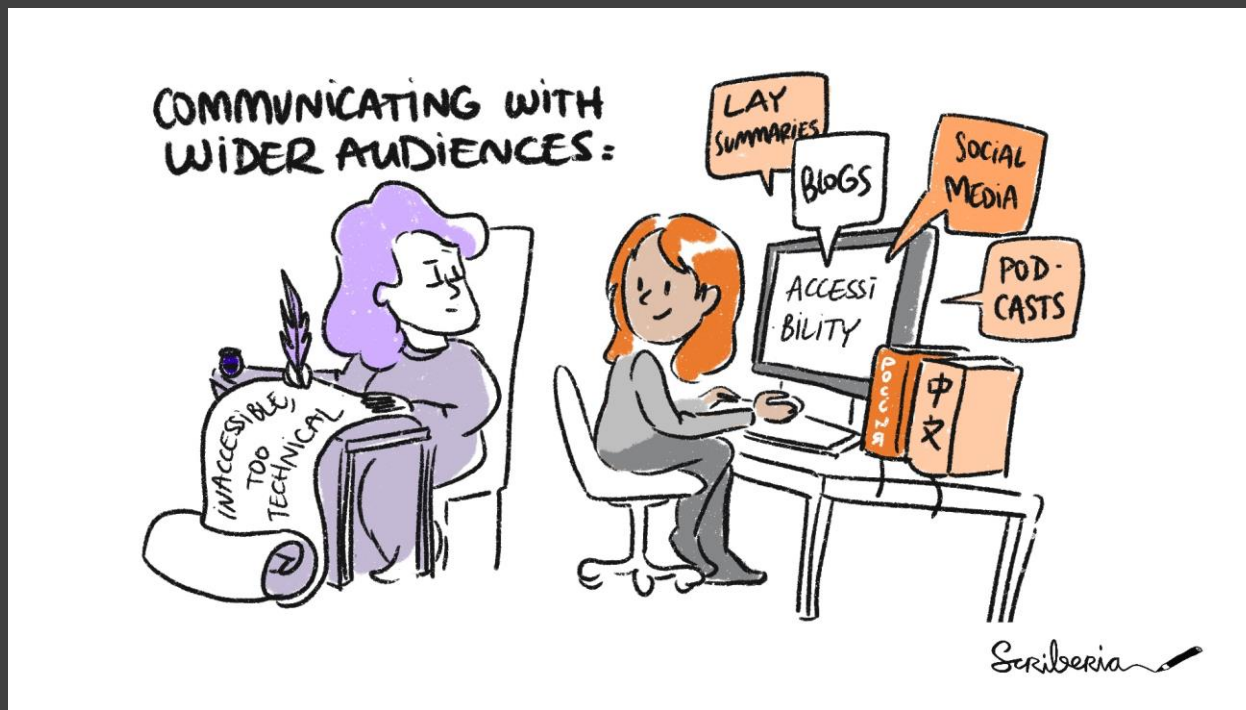


Ethical Research



Community Handbook

Guide for Communication



Overview of Guide for Communication

Open Scholarship

Blogs for Research

Communication

Social Media for Research Communications

Making Research Objects Citable

Publishing Different Article Types

Communications in Open Source Projects

Authorship and Contributions on Academic Articles

Peer Review

Guide for Collaboration

Getting Started With GitHub

Maintainers and Reviewers
on GitHub

Managing a New
Community and Team

Leadership in Data Science

Research Infrastructure

Roles

Remote Collaboration

Shared Ownership in Open
Source Projects



Guide for Ethical Research

Introduction to Research Ethics

Research Ethics Committees Workflows

Ethical Decisions in Preclinical Research

Law, Policy and Human Rights in Ethics

Activism for Researchers

Internal Policy Advocacy

Self-Reflection



Guide for Project Design

Overview of Project Design

Planning for Project Design

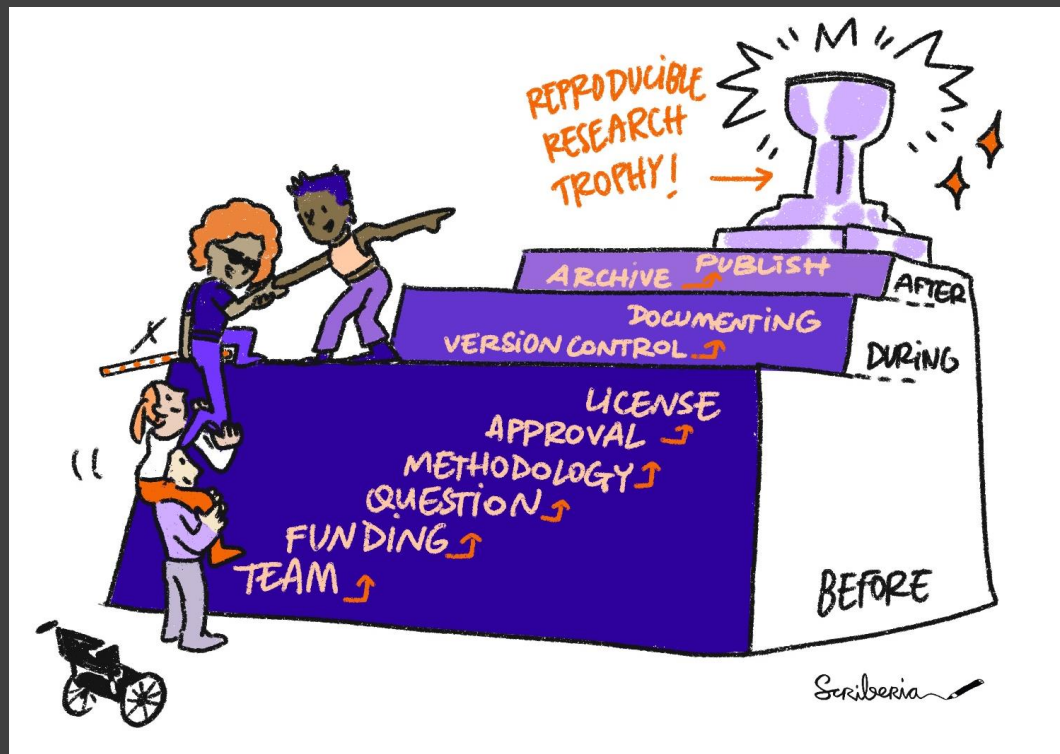
Communication and
Collaboration

Reproducibility Methods

Version Control and
Documentation

Sharing Your Research
Work

Creating Project Repositories





Book:
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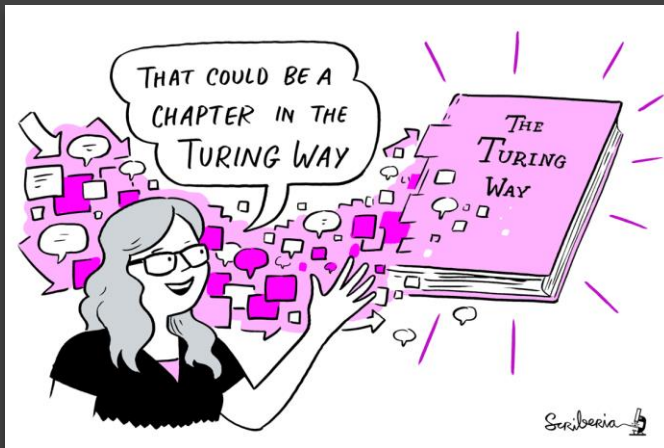
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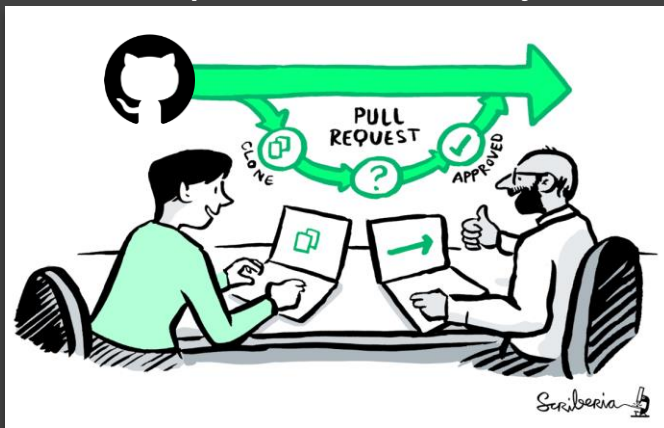
A Book



A Community



An Open Source Project



A Culture of Collaboration





Book:
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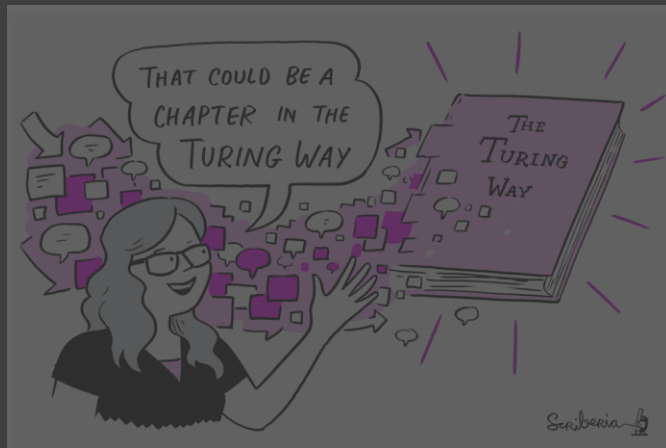
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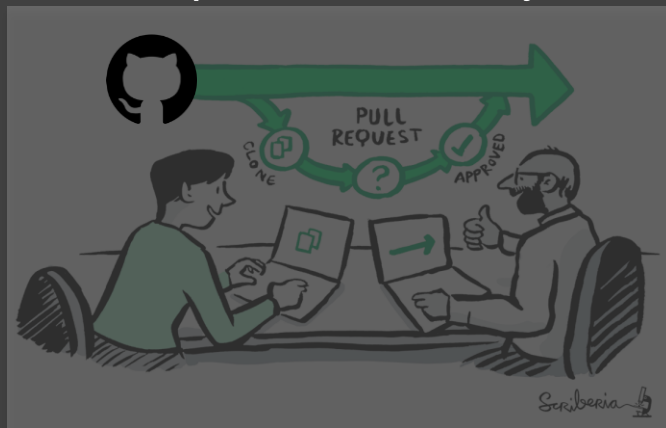
A Book



A Community

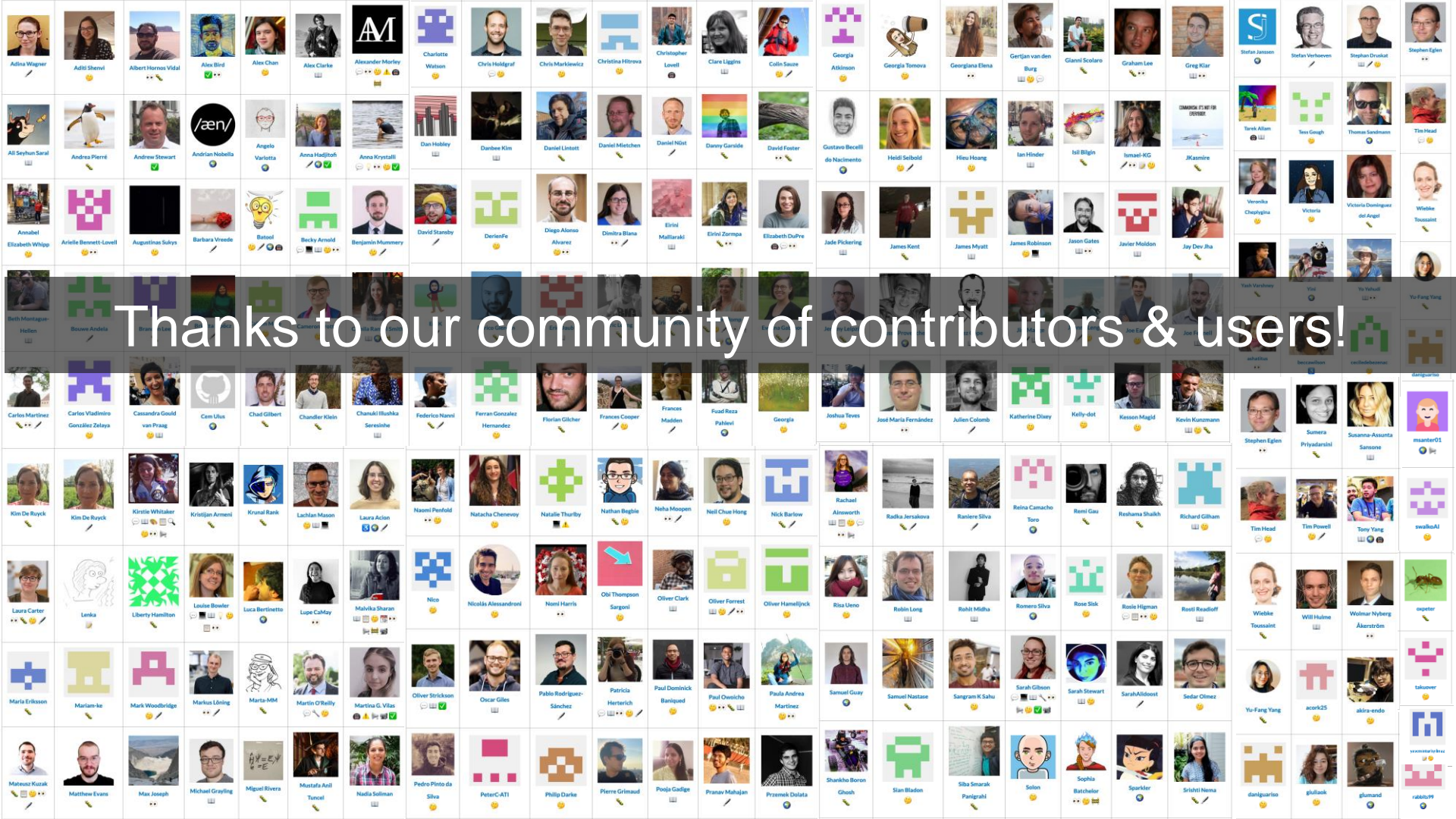


An Open Source Project



A Culture of Collaboration





Thanks to our community of contributors & users!

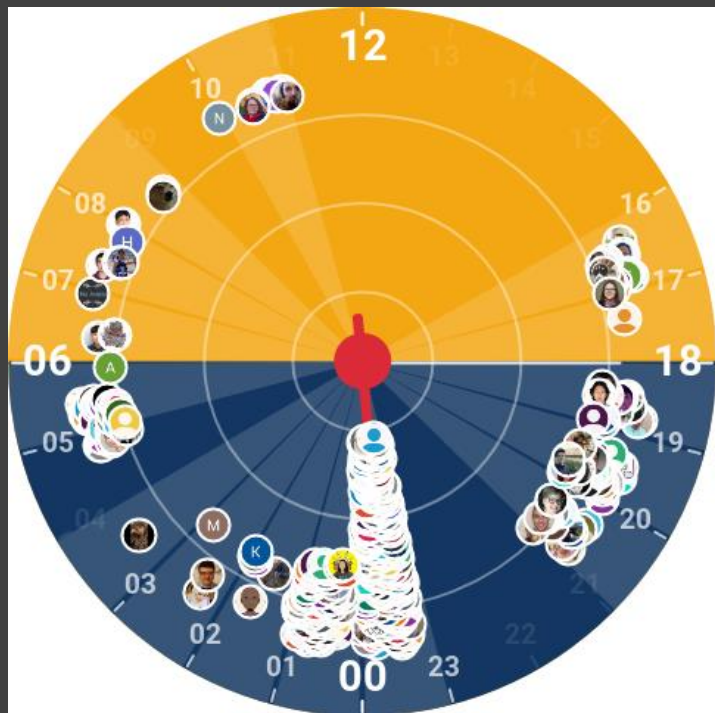
📁 .github	Remove prettier configuration
📁 book	minor update
📁 communications	Fix typos
📁 conferences	Add KW formatting pedantry
📁 project_management	Update online-collaboration-cafe.md
📁 templates	Updating Github templates
📁 tests	Add "et cetera" as a deprecated Latinism
📁 workshops	Remove mis-pasted text
📄 .all-contributorsrc	Merge pull request #991 from alan-turing-institute/all-contributors/a... 5 days ago
📄 .gitignore	ignore pptx in workshop folder 9 months ago
📄 .travis.yml	add html-proof file again last month
📄 <u>CODE_OF_CONDUCT.md</u>	her -> their 6 months ago
📄 <u>CONTRIBUTING.md</u>	Update CONTRIBUTING.md 2 months ago
📄 GOVERNANCE.md	Read through months later 5 months ago
📄 LICENSE.md	Fix typo in licence 2 months ago
📄 <u>README.md</u>	Merge pull request #991 from alan-turing-institute/all-contributors/a... 5 days ago
📄 book_skeleton.md	Update book_skeleton.md 13 months ago
📄 <u>contributors.md</u>	Add myself to contributors.md 11 months ago
📄 tips_and_tricks_survey.md	Update tips_and_tricks_survey.md 14 months ago
📄 ways_of_working.md	Adjust team contact section 5 months ago



Scribbles

GitHub:
<https://github.com/alan-turing-institute/the-turing-way>

Global community: translation & contextualisation



all contributors 322

Camila Rangel-Smith (crangelsmith)	Senior Research Data Scientist, The Alan Turing Institute	The Turing Way Translation and Localisation Co-Lead
Batool Almarzouq (BatoolMM)	Postdoctoral Researcher, KAIMRC and Honorary Research Fellow, The University of Liverpool	The Turing Way Translation and Localisation Co-Lead
Alejandro Coca Castro (acocac)	Postdoctoral Research Associate, The Alan Turing Institute	The Turing Way Translation and Localisation Co-Lead
Andrea Sánchez-Tapia (AndreaSanchezTapia)	Independent researcher	The Turing Way Translation and Localisation Co-Lead

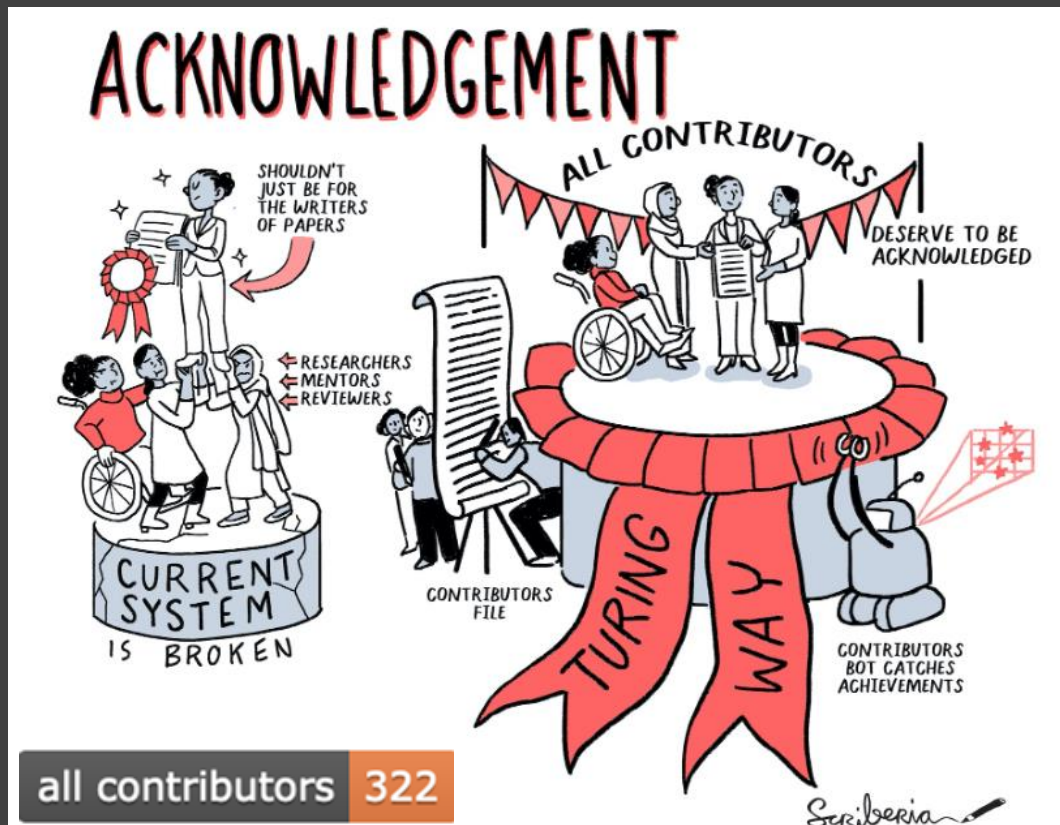
crowdin

Turing Way

Project home

- Arabic (ar)
- Chinese Simplified (zh-CN)
- Portuguese, Brazilian (pt-...)
- Spanish, Latin America (e...)

Recognition for all Contributors



all contributors 322

Record of Contributions

Personal Highlights from *The Turing Way* Contributors

A

Achintya Rao

Alejandro Coca

Alexander Morley

Andrea Sanchez Tapia

Andreea Avramescu

Ankur Kumar

Anna Krystalli

Arielle Bennett

Collaborating Organisations and Projects

Delft University of Technology - Faculty of Applied Sciences
Netherlands eScience Center
FAIR Cookbook
Open Life Science
Remote Computational Project Resource

Cite as: *The Turing Way Community*. (2021). *The Turing Way: A handbook for reproducible, ethical and collaborative research (1.0.1)*. Zenodo. <https://doi.org/10.5281/zenodo.5671094>

Inclusive practice and recognition

"One of the most *destructive divisions in academia* is that between those who conduct research and those who are recognised for conducting research.

... essential, hidden roles are rarely celebrated alongside research achievements, which can make it hard to convince graduates [...] to consider them as career options."

Highly commended: *The Turing Way*, The Turing Way Community, The Alan Turing Institute



Simon Hettrick

Director of the Southampton Research Software Group

hidden
REF



Book:
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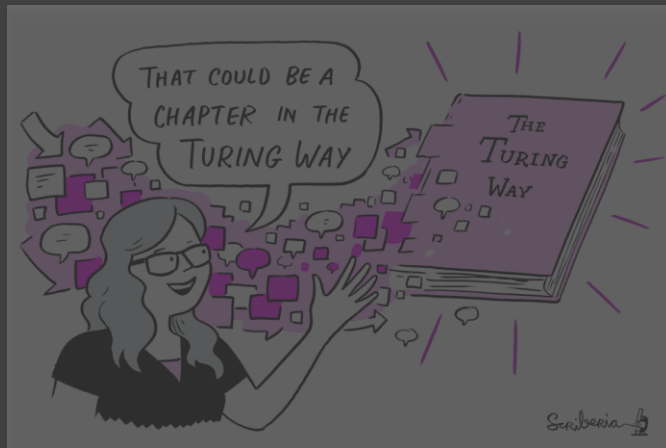
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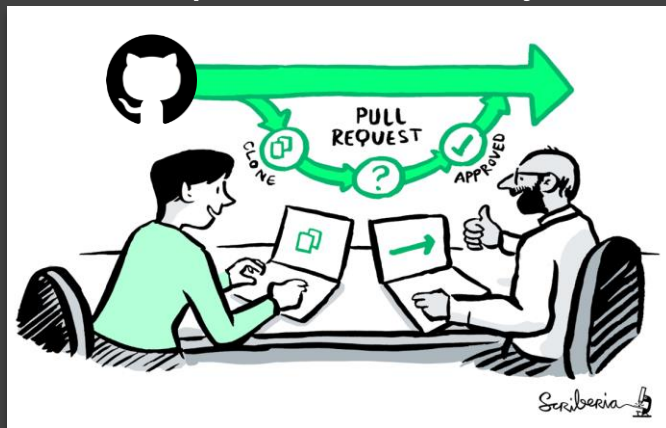
A Book



A Community



An Open Source Project



A Culture of Collaboration



An open source project

- Everyone can freely read, reuse, distribute, modify and help develop.
- The project belongs to *The Turing Way* community.
- Built on open source infrastructure:
 - Git, Jupyter Book, Binder, project bots etc.
 - Nelfy: the-turing-way.[netlify.app/welcome](https://nelfy.netlify.app/welcome)

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The Turing Way

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September 3, 2020 [0] Presentation Open Access View

Challenges in Assessing Contributions to Reproducible Research and Open Science

Sharan, Malvika

DORA Panel Addressing Roadblocks in Research Assessment Reform Panel organizer and moderator: Helen Star Speakers: Malvika Sharan (presentation in this Zenodo deposit) with Elena Simukovic, David Carr, Ulrich Dirnagl, Anne Letho, Serhi Nazarovets about the panel. Research evaluati

Uploaded on September 3, 2020

1 more version(s) exist for this record

August 11, 2020 [0] Presentation Open Access View

FSC2020 Lightning Talk: The Turing Way

Esther Plomp, @KirstieWhitaker

Lightening talk presented by Esther Plomp on the 3rd of August 2020 for the Force11 Scholarly Communication Institute (FSC2020). Reproducible research is necessary to ensure that scientific work can be trusted. By sharing data, analysis code and the computational environment used to generate the r

Uploaded on August 11, 2020

August 6, 2020 [0] Journal article Open Access View

The Turing Way workshop on Boost your reproducibility with Binder

Sharan, Malvika.

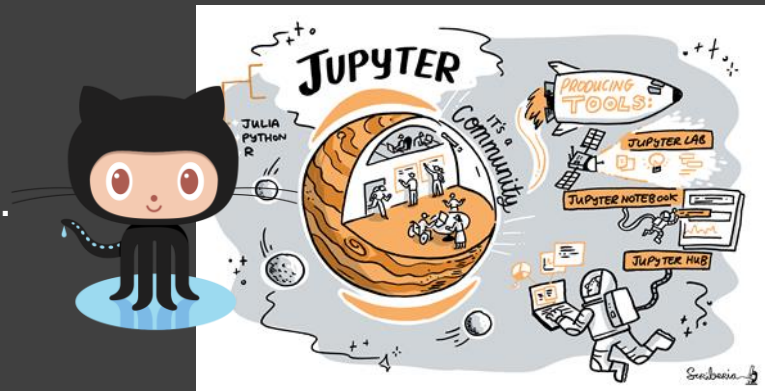
This workshop was organized with the UKDR1 team. Title: The Turing Way workshop on Boost your reproducibility with Binder Date: 11 June, 2020 13:00 - 17:00 (GMT) Instructors: Kirstie Whitaker, Sarah Gibson, Malvika Sharan Shared notes: <https://hackmd.io/@malvikasharan/Binder-June2020> Agenda

Uploaded on August 6, 2020

Curated by: The Turing Way

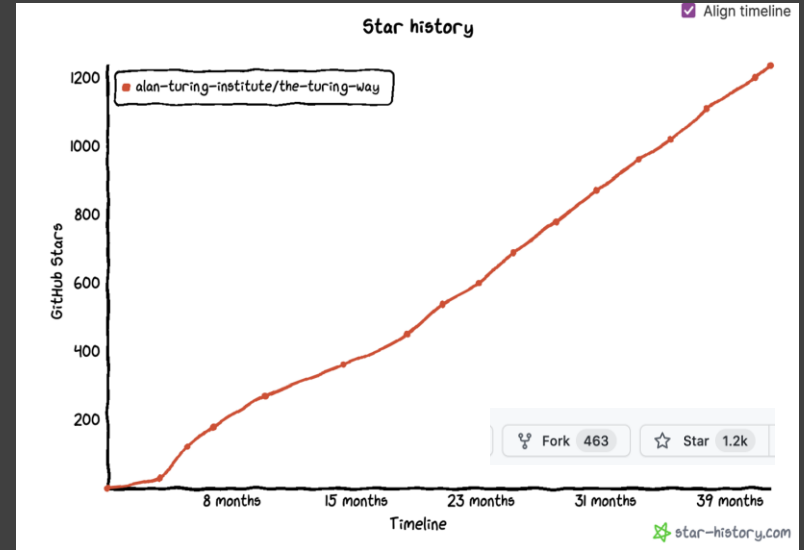
Curator policy: Not specified

Created: March 19, 2019



Project and community growth

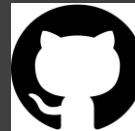
- 3 years, >250 Live Chapters
- Community resources, events, guidance, templates, training
- 325+ direct GitHub contributors and thousands of users



<https://zenodo.org/record/3332807>



8,944 views 11,065 downloads



Qualitative/notable impacts

Resources are being used by **learners, educators, community builders, policy makers and researchers** globally

- Reproducibility of scientific results in the **EU 2020 (report)**
- An Emerging Technology Charter by **Mayor of London (policy)**
- Innovation Scholars: **UKRI grant 2020 (funding call)**
- CodeRefinery and Library Carpentries **training materials**
- Recommended in **Goldacre Review for modern open working** into health data
- Cited by **30+ peer-reviewed articles** & 100+ online publications



Book:
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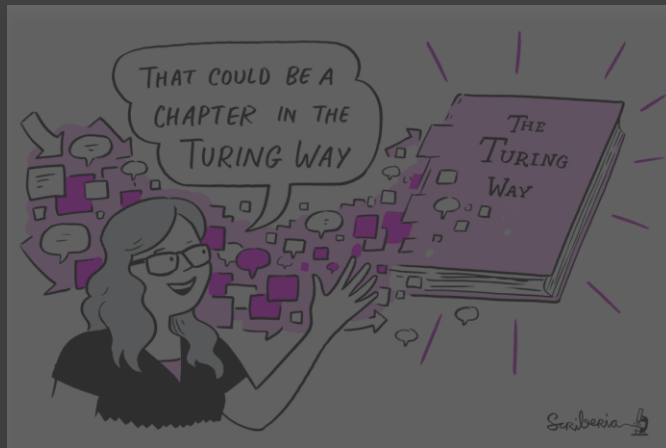
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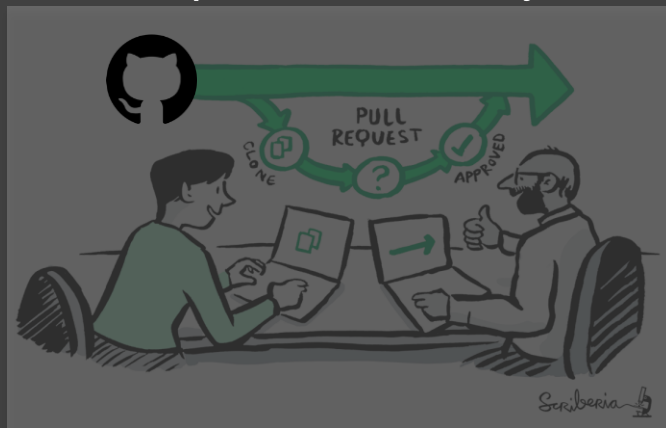
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A Culture of Collaboration



Pathways for collaboration



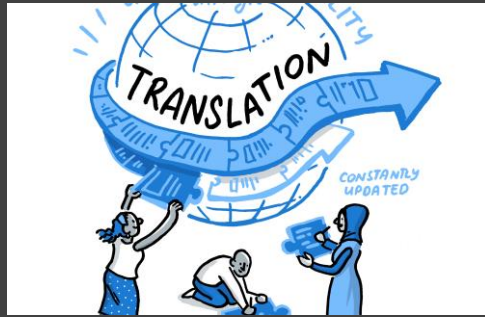
Diverse Perspectives



Combined Efforts



Engagements



Equitable Participation



Open Recognition



Co-Creation

Opportunities for connections



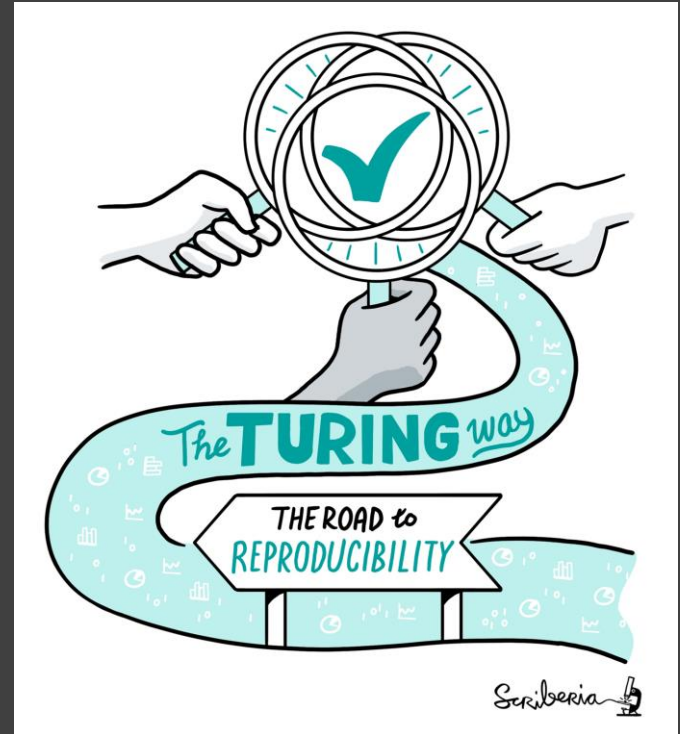
Co-working Calls & Collaboration Cafés



Biannual Book Dash Events

A note on the name

- This is **not** a Turing project (although it has great support from the Institute)
- We are creating guidance together, **the way** is a journey not a set of rules



Organisation-wide collaboration

Afterword

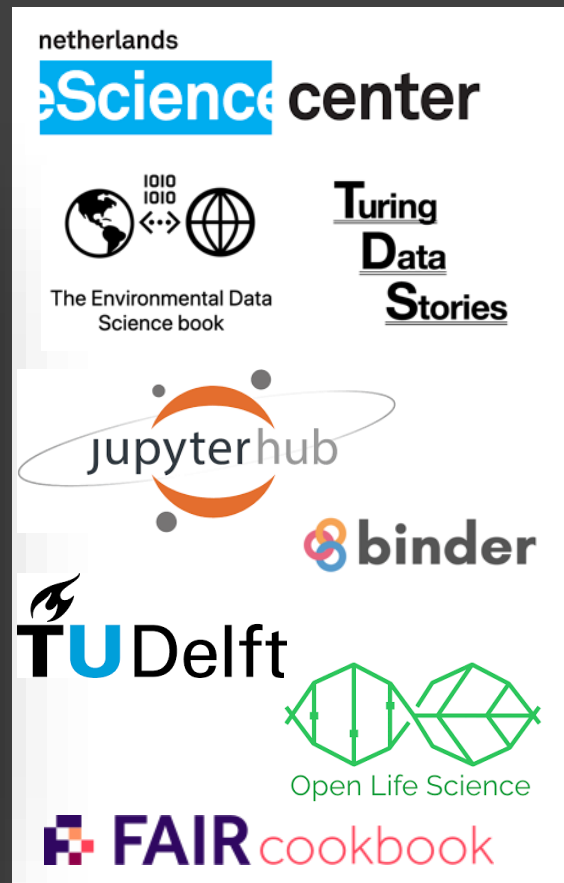
Glossary

Bibliography

Contributors Record

Collaborating Organisations

When members participate in The Turing Way community with the in-kind support of their funders and organisation, we acknowledge each member individually and list their organisations as “Collaborating organisations”. Such organisational supports are applicable when one or multiple members from a project or community collaborate to build resources in The Turing Way.



The Turing Way Community Handbook

Community Handbook

Code of Conduct

Ways to Enter the Project

Style Guide

Maintaining Consistency

Chapter Templates and
Contribution Workflow

Acknowledging Contributors

Monthly Newsletters

Book Dash Events

Community Coworking Calls

Template Collection



Evidence of successful replication or extension

- **Quality Assurance of Code for Analysis and Research**, Office for National Statistics , UK
- **Turing Data Stories, Turing Commons and The Environmental Data Science book**, The Alan Turing Institute
- **FAIR Cookbook** by researchers at University of Oxford, Novartis, FAIRplus Consortia (collaboration with ELIXIR-UK)
- **UCL Institute of Health Informatics Coding Club Handbook**, University College London
- **A Citizen Science Guide for Research Libraries**, LIBER Citizen Science Working Group

Fireside Chat: Monthly Informal Events

Reflections, Replications and Perspectives from *The Turing Way*

30 June 2022, 15:00 UTC

Hosted by



Register on Eventbrite



Alejandro Coca-Castro

Postdoc, The Alan Turing &
The Environment Data Science
Book Lead



Emma Karoune

Senior Community Manager,
The Alan Turing Institute &
Open Phylooliths Community



Patricia Herterich

Research Data Specialist,
Digital Curation Centre,
University of Edinburgh



Andrea Sánchez-Tapia

Translation & Localisation
co-lead in The Turing Way



Anne Lee Steele

Community Manager,
The Turing Way



Malvika Sharan

Co-Lead Investigator
The Turing Way



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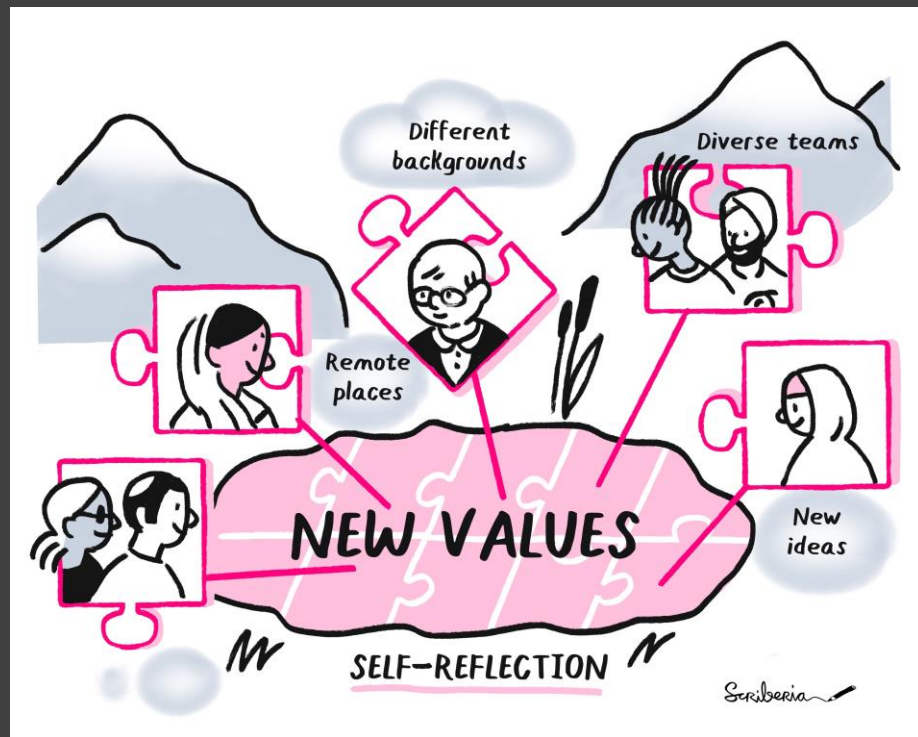
Fireside Chat Series

The June 2022 event is hosted with The Environmental Data Science & Open Phylooliths. Fireside Chat series features people, ideas & projects in open and reproducible research.

The Turing Way Events

- *Collaboration Cafes*
 - 1st & 3rd Wednesdays (14:00 UTC)
- *Coworking Calls*
 - Mondays (10:00 UTC)
- *Fireside Chats*
 - Monthly (on Friday)
- *More ways to connect*

bit.ly/turingway



What does open mean to You?

- Learning from the ‘**Commons**’
- Purpose is to ensure scientific integrity and quality outcomes:
The Turing Way
- Hidden labour, collaborative process, **community practices**
- Building open science skills with a **global community**



Reproducibility

- Is my "work" **correct**?
- Can others **read/test** it?
- Is my **workflow robust**?
- Have I provided **manual**?
- Is my work **citable**?

Open Science

- Is my "work" **freely available**?
- Can others **modify/share**?
- Is my **workflow reusable**?
- Have I given **permission**?
- Is my work **open for collab**?

Reproducibility

- Is my "work" **correct**?
- Can others **read/test** it?
- Is my **workflow robust**?
- Have I provided **manual**?
- Is my work **citable**?

Reproducibility should ensure higher scientific standards allowing others to read, test and reuse your work.

Open Science

- Is my "work" **freely available**?
- Can others **modify/share**?
- Is my **workflow reusable**?
- Have I given **permission**?
- Is my work **open for collab**?

Open Science should additionally allow reporting errors, fixing issues, build on, collaborate and sustain your work.

Community Building

Open is by default not:

- Inclusive
- Accessible
- Community-led

Intentional designing



Take possible steps towards openness

“Openness is not a binary condition, but highly situational, contingent and dependent on the privilege and context of knowledge makers and gatekeepers.”



**Knowledge
Equity Lab**



Leslie Chan

Associate Professor, Dept.
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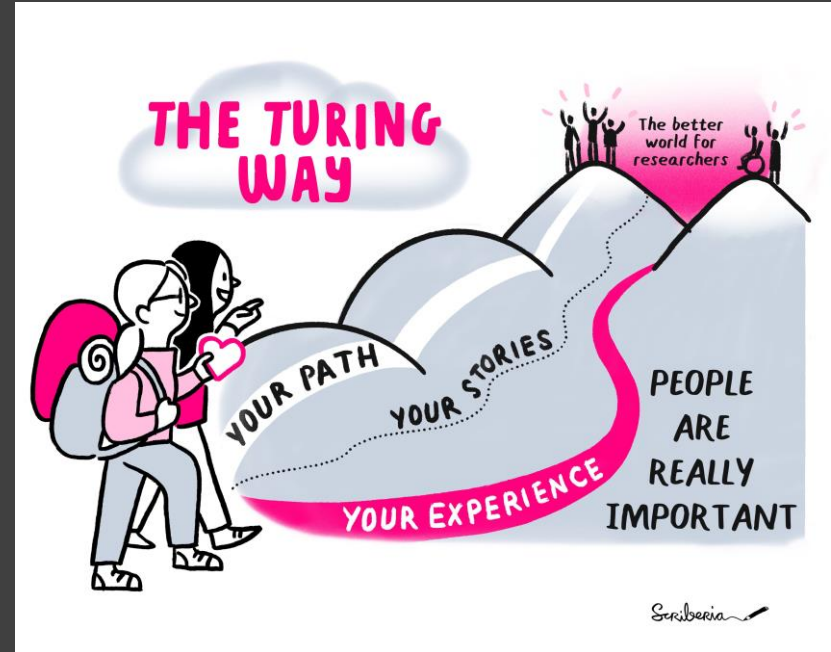
Contextualising Openness, 2020, edited by Leslie Chan. A. Okune, R. Hillyar, D. Albornoz, A. Posada

@malvikasharan, @ekaroune, @turingway, CC-BY image by *The Turing Way* and Scriberia, DOI: 10.5281/zenodo.6737966

Meeting you where you are!

- i. Join the community
- ii. Learn a new skill
- iii. Share your skills
- iv. Collaborate with others
- v. Mentor others' contributions
- vi. Represent this community

We value your participation!





Open Life Science

A mentoring & training program for Open Science Ambassadors in Life Science

Sharing

Connecting

Empowering

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1:1 mentoring



Training calls on Open Science

Talks from experts
Break out discussions



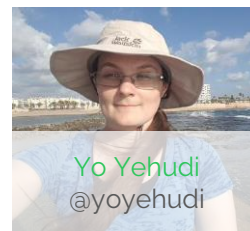
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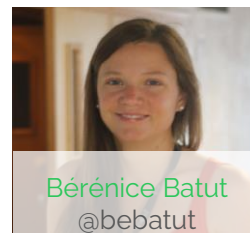
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Reimagining Openness

Open Science is not a radical approach, but a **tool to learn, unlearn, challenge, dismantle and reimagine research infrastructure** that prioritises equitable participation, co-creation and culture change.



Acknowledgements & Links

The
Alan Turing
Institute

The Turing Way Community

- **Book:** the-turing-way.netlify.com, **Twitter:** twitter.com/turingway
- **GitHub:** github.com/alan-turing-institute/the-turing-way
- **Useful links & opportunities are listed here:** <https://bit.ly/turingway>



Open Life Science

- **Website:** openlifesci.org/, **Twitter:** twitter.com/openlifesci



Open Phytoliths

- **Twitter:** twitter.com/open_phytoliths, **GitHub:** github.com/open-phytoliths

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