

**The
Alan Turing
Institute**

**Reproducibility in practice:
*Insights from The Turing Way***

Emma Karoune & Vicky Hellon

Pronouns: she/her



Introductions



Vicky Hellon
Community Manager
Turing-Roche Partnership



Emma Karoune
Senior Community Manager
Turing-RSS Health Data Lab
& DECOVID

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

Established in 2015 as the National Institute for Data Science and AI

- Advanced world-class research and apply it to real-world problems
- Train the leaders of the future
- Lead the public conversation



Research Programmes

Sector
Specific



Cross-
Cutting



Tools, Practices and Systems

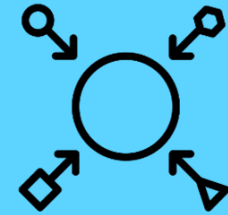
- Trustworthy systems
- Transparent reporting
- Inclusive interoperable design
- Ethical integrity
- Respectful co-creation
- Leadership in open research



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.”

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

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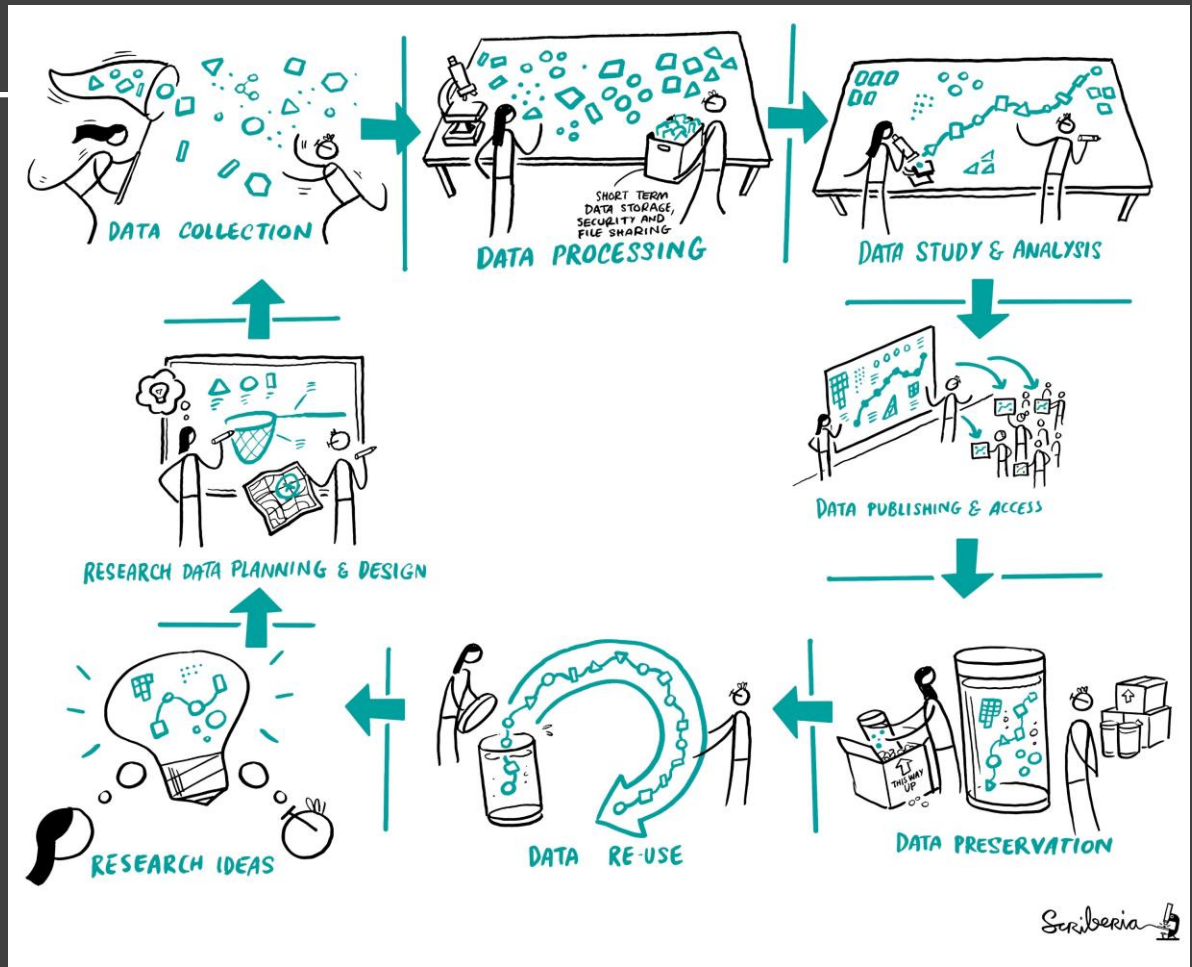


Reproducibility

		Data	
		Same	Different
Analysis	Same	Reproducible	Replicable
	Different	Robust	Generalisable

Reproducibility

		Data	
		Same	Different
Analysis	Same	Reproducible	Replicable
	Different	Robust	Generalisable



Scriberia

Added advantages of reproducibility



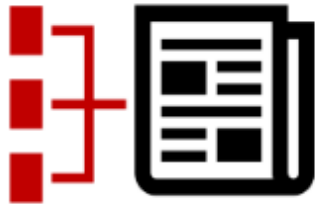
Track Project History



Collaborate & Review



Avoid Misinformation



Write Paper Efficiently



Get Credits Fairly



Ensure Continuity

**Is not considered
for promotion**

Held to higher
standards than
others

Publication bias
towards novel
findings

**Requires
additional
skills and a
change of
mindset**

Barriers to reproducibility

Plead the 5th

Support additional
users

Takes time

Guide for Reproducible Research

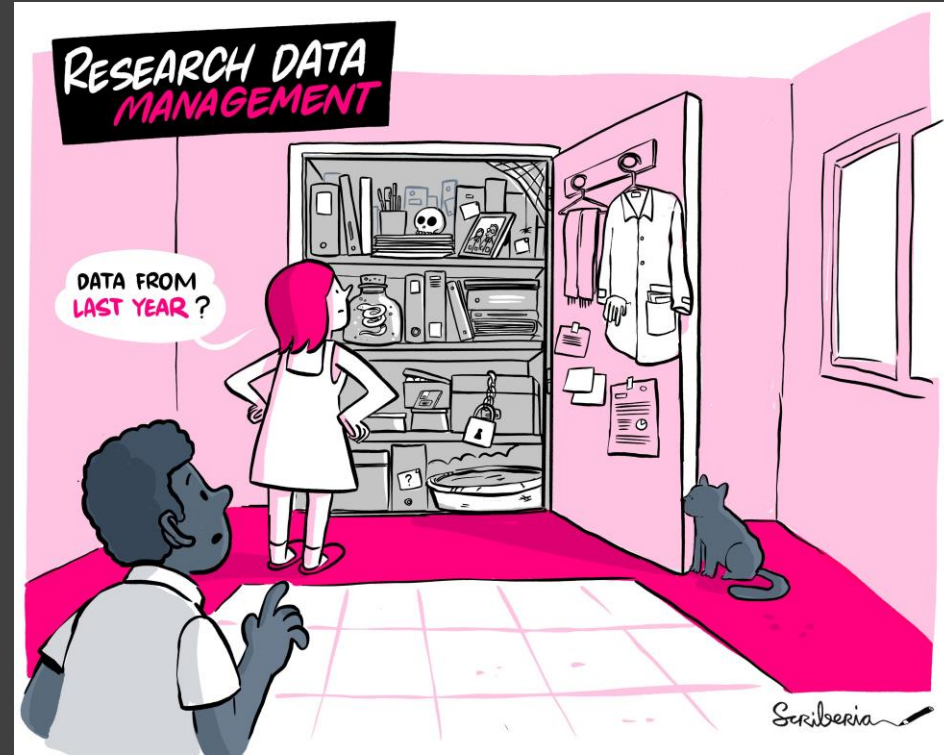
- Overview
- Open Research
- Version Control
- Licensing
- Research Data Management
- Reproducible Environments
- BinderHub
- Code quality
- Code Testing
- Code Reviewing Process
- Reusable Code
- Continuous Integration (CI)
- Reproducible Research with Make
- Research Compendia



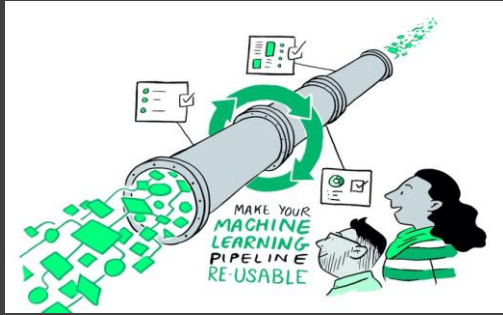
Fig. 3 The Turing Way project illustration by Scriberia. Used under a CC-BY 4.0 licence. DOI: [10.5281/zenodo.3332807](https://doi.org/10.5281/zenodo.3332807).

Case study: data management for reproducibility

- Data management – whose responsibility is it?
 - Version control
 - Transparent recording
- Preparing for FAIR and as open as possible data



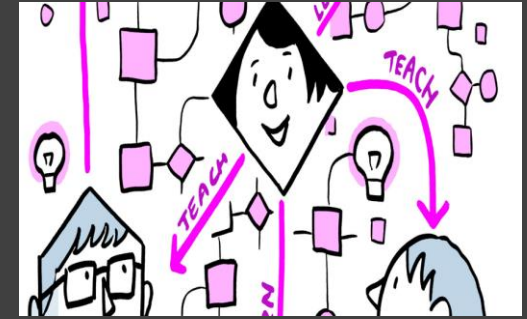
The Turing Way Guides



Reproducibility



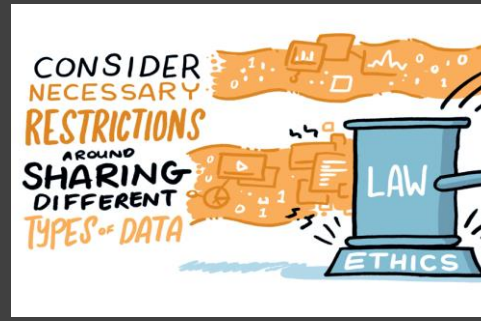
Project Design



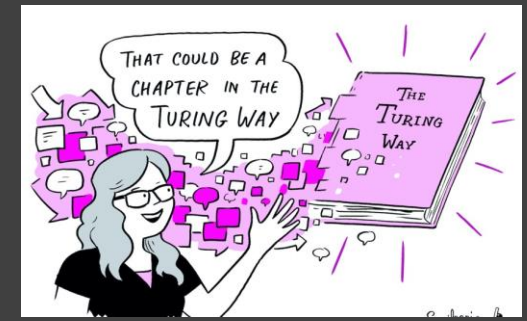
Communication



Collaboration



Ethical Research



Community Handbook

Guide for Project Design

Guide for Project Design ^

Overview of Project Design v

Creating Project v

Repositories

Personas and Pathways v

File Naming Convention

Code Styling and Linting v

Sensitive Data Projects v

Managing Sensitive Data Projects v

Working on Sensitive Data Projects v



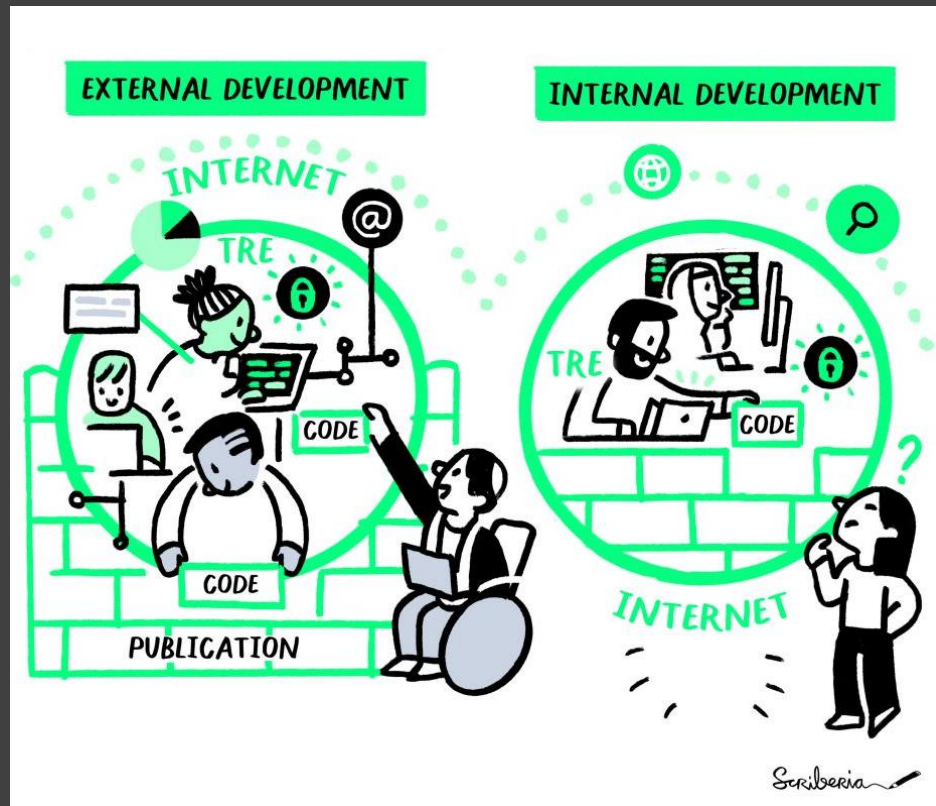
Case study: Working with sensitive data

- Data safe havens
 - code development

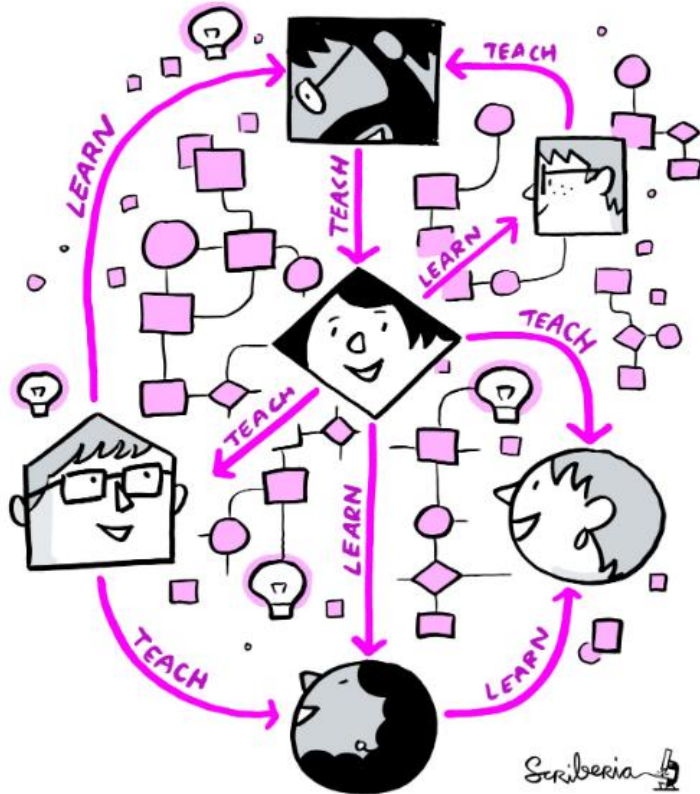


Ed Chalstrey
RSE at Turing

<https://the-turing-way.netlify.app/project-design/sdpw/trew.html>



Guide for Communication



Guide for Communication ^

Overview of Guide for
Communication v

Open Scholarship v

Blogs for Research
Communication v

Lay Summaries v

Podcasts for Research
Communication v

Presenting Posters and
Conference Talks v

Social Media for Research
Communications v

Making Research Objects v

Citable

Publishing Different Article
Types v

Communications in Open
Source Projects v

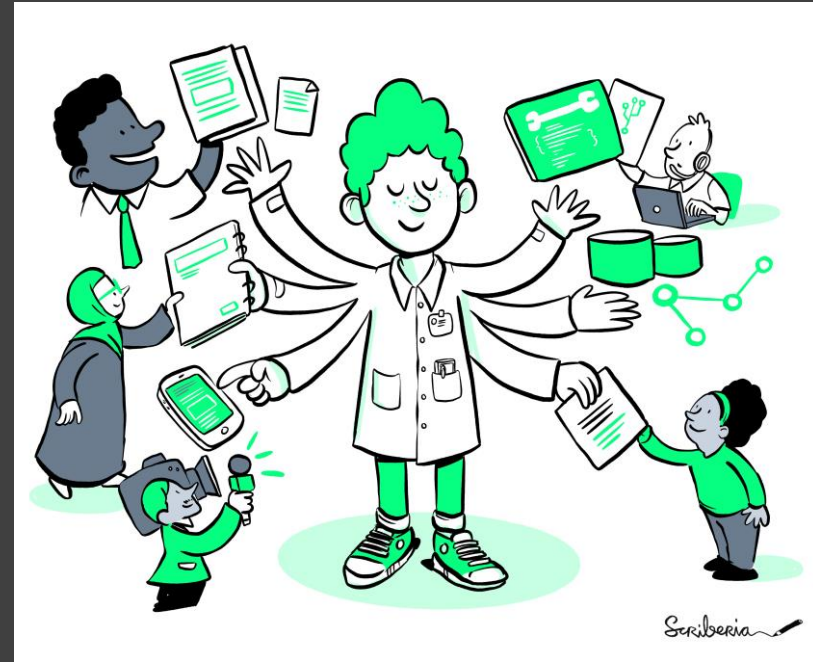
Authorship and
Contributions on Academic
Articles v

Peer Review v

Binder v

Case study: reporting reproducible research

- Expansion beyond ‘traditional research articles’
- Allows research/analysis objects to be described in more detail- supporting openness and reproducibility
- Sufficient credit for people involved e.g software engineers, analysts, data stewards



Guide for Collaboration

Guide for Collaboration ^

Getting Started With GitHub v

Maintainers and Reviewers
on GitHub v

Managing a New
Community and Team v

Leadership in Data Science v

Research Infrastructure
Roles v

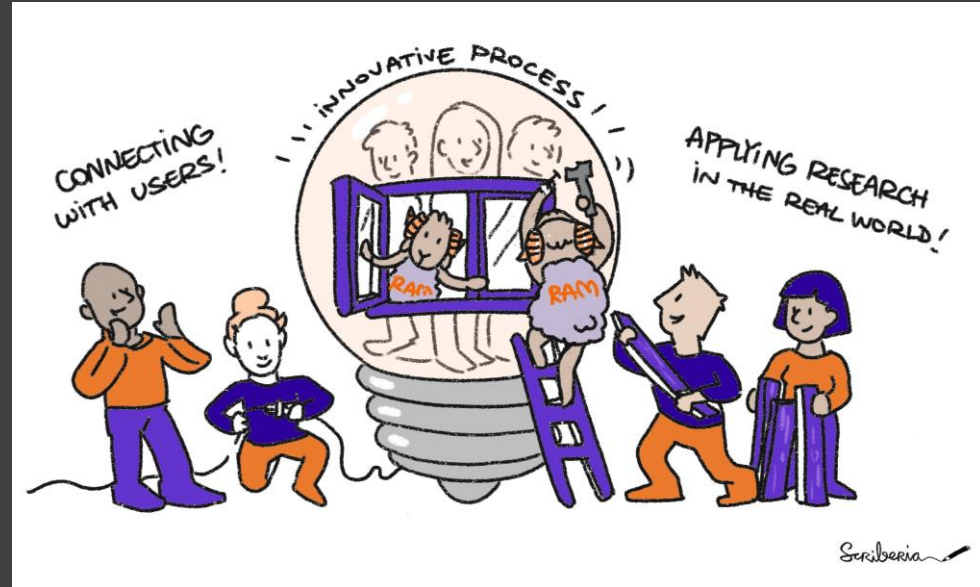
Remote Collaboration v

Shared Ownership in Open
Source Projects v



Case Study: Research Infrastructure Roles

- Facilitating the research and building collaboration
- Without these roles a lot of projects wouldn't succeed!
- Key for encouraging best practices and reproducibility in projects



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

Guide for Ethical Research

Guide for Ethical Research ^

Introduction to Research Ethics

Research Ethics Committees Workflows

Ethical Decisions in Preclinical Research

Law, Policy and Human Rights in Ethics v

Activism for Researchers v

Internal Policy Advocacy

Self-Reflection v

Ethical Considerations for Open Source Governance Models

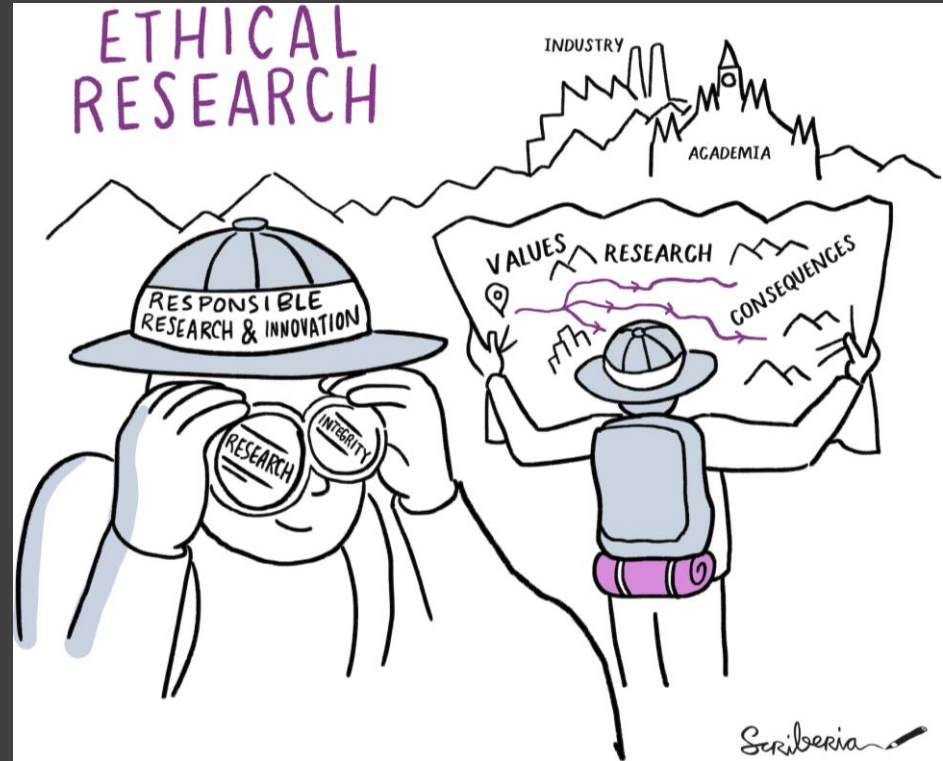


Case study: Embedding responsible research practices

Turing Ethics team developed a RRP Guide:

- Bias self assessment
- Transparent reporting

<https://alan-turing-institute.github.io/rrp-selfassessment/introduction.html>





Book:
the-turing-way.netlify.app/

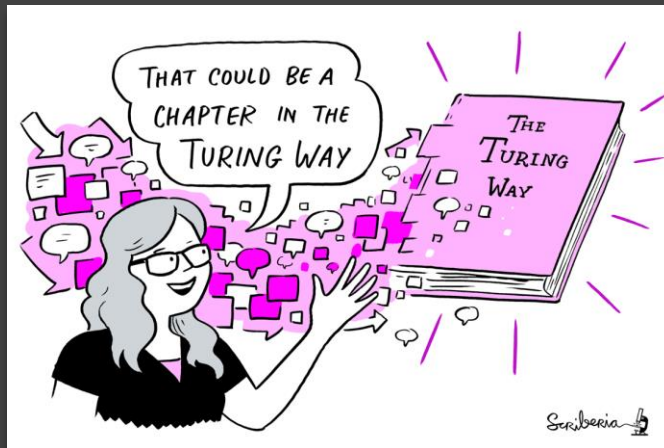
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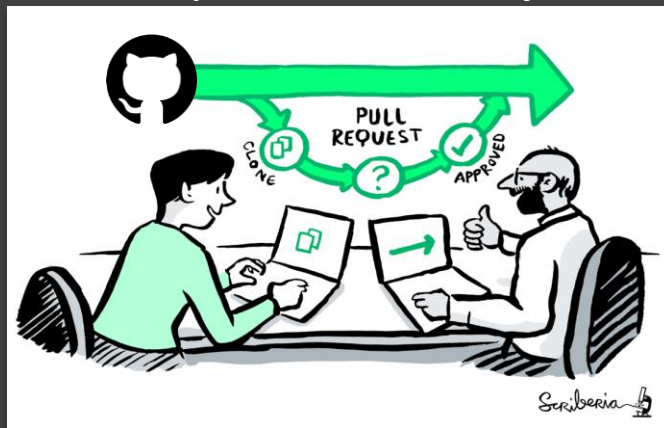
A Book



A Community



An Open Source Project

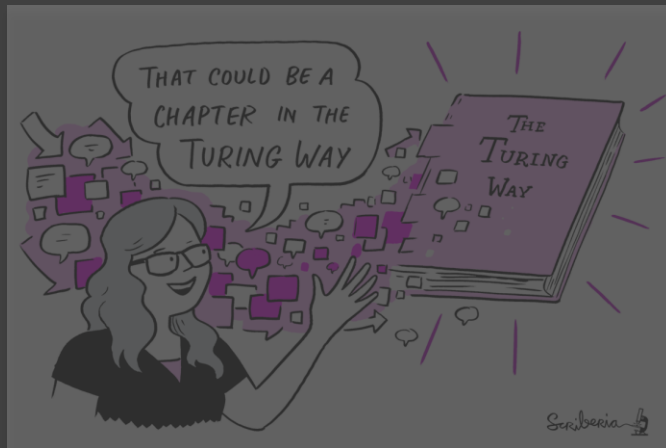


A Culture of Collaboration





A Book



Book:
the-turing-way.netlify.app/

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

Twitter:
twitter.com/turingway

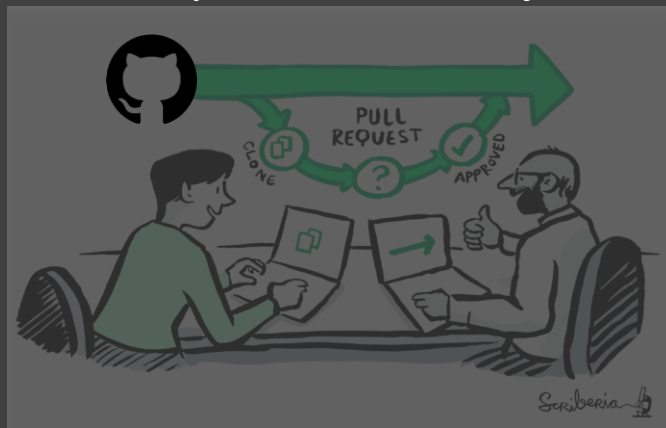
Email:
theturingway@gmail.com

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A Community

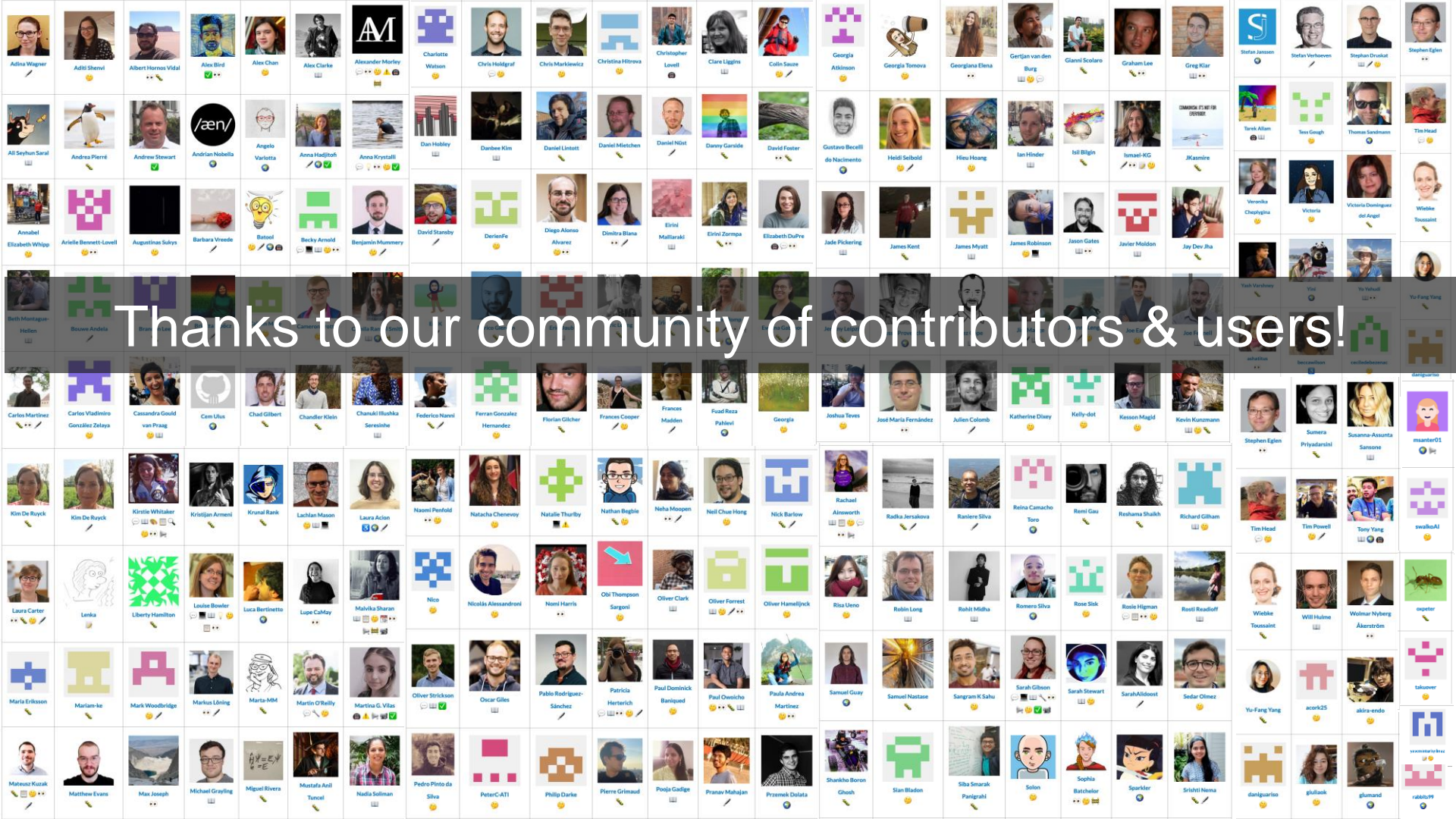


An Open Source Project



A Culture of Collaboration





Thanks to our community of contributors & users!

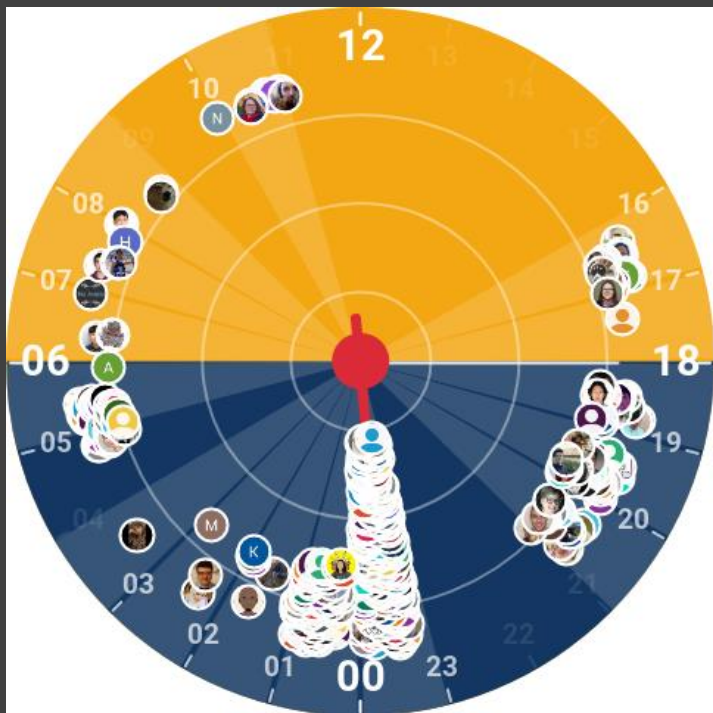
📁 .github	Remove prettier configuration
📁 book	minor update
📁 communications	Fix typos
📁 conferences	Add KW formatting pedantry
📁 project_management	Update online-collaboration-cafe.md
📁 templates	Updating Github templates
📁 tests	Add "et cetera" as a deprecated Latinism
📁 workshops	Remove mis-pasted 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

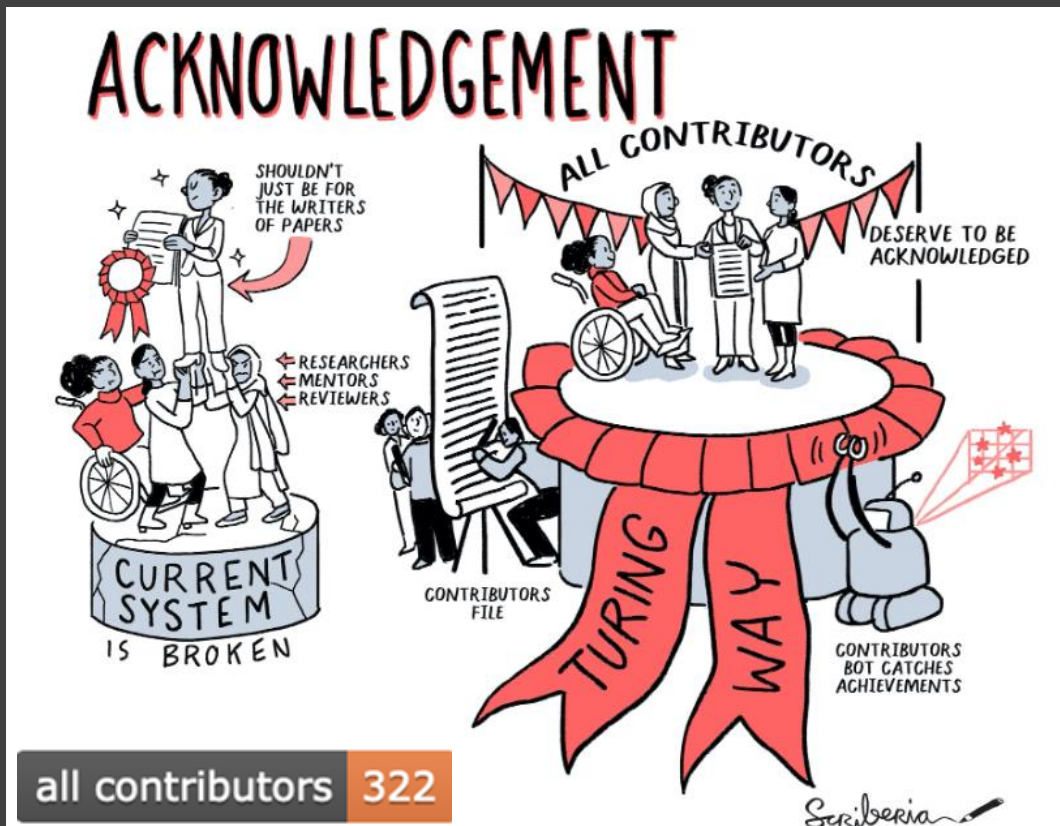
crowdin

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>

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.
 - Nelify: the-turing-way.netlify.app/welcome

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The Turing Way

Recent uploads

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September 2, 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 Lightening Talk: The Turing Way

Esther Plomp, @ Kirstie Whitaker

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

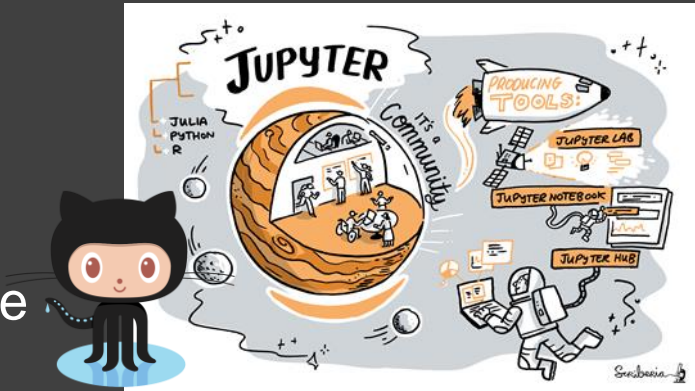
The Turing Way workshop onBoost your reproducibility with Binder

Sharan, Malvika.

This workshop was organized with the UKDR 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/@malvika/sharan/Binder.June2020> Agenda

Uploaded on August 6, 2020

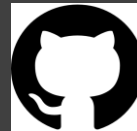
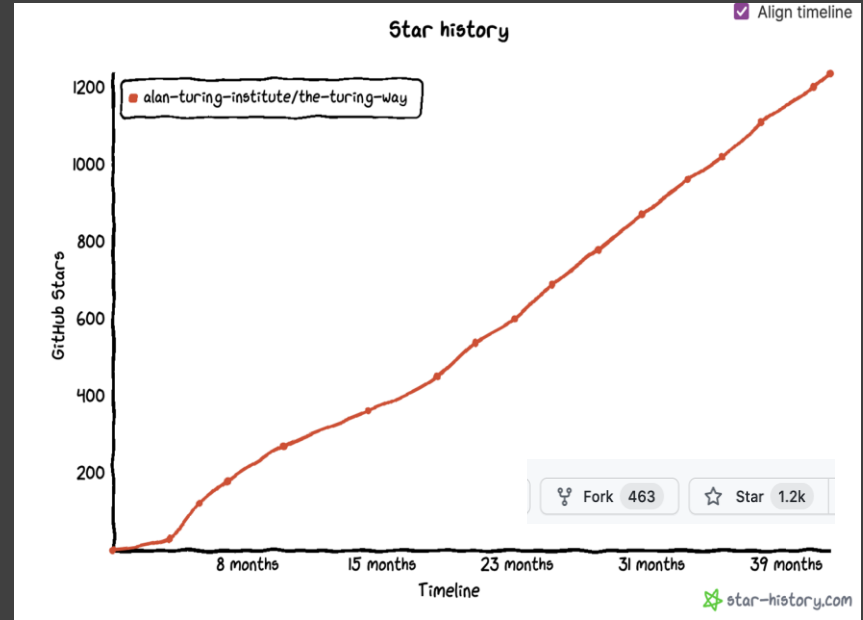
Curated by: The Turing Way
Curation policy: Not specified
Created: March 19, 2019



Project and community growth

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

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



Qualitative/notable impacts

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

- Featured in **Goldacre Review** (2022)
- Highly-commended project in **The Hidden REF** Competition (2022)
- Reproducibility of scientific results in the **EU 2020 (report)**
- An Emerging Technology Charter by **Mayor of London (policy)**
- Innovation Scholars: **UKRI grant 2020 (funding)**
- CodeRefinery and Library Carpentries (training materials)
- Projects by data scientists including at the Office for National Statistics
- **Cited by 30+ peer-reviewed articles** & 100+ online publications



Book:
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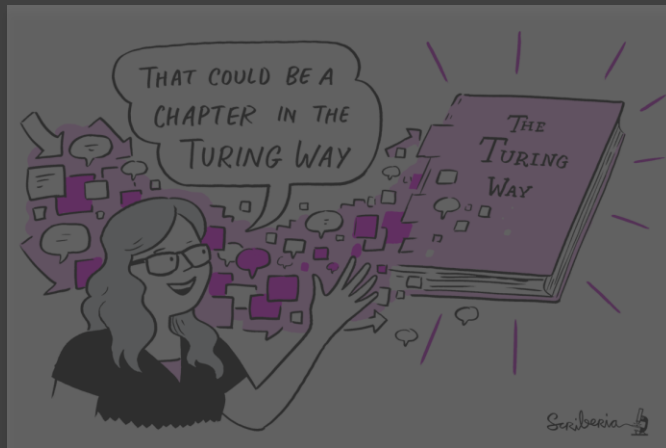
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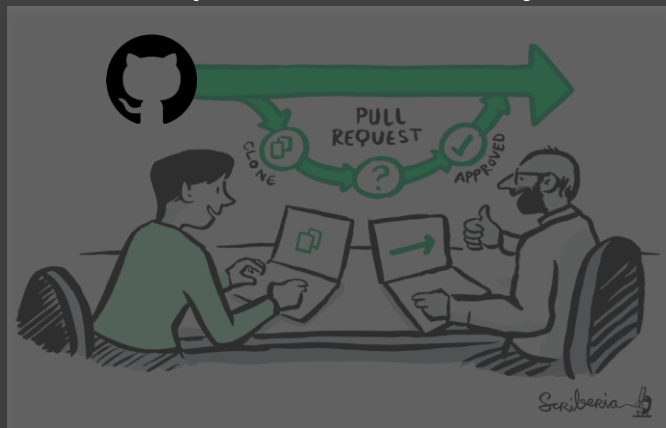
A Book



A Community



An Open Source Project



A Culture of Collaboration



Pathways for collaboration



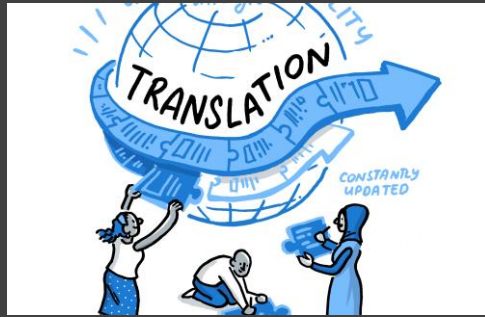
Diverse Perspectives



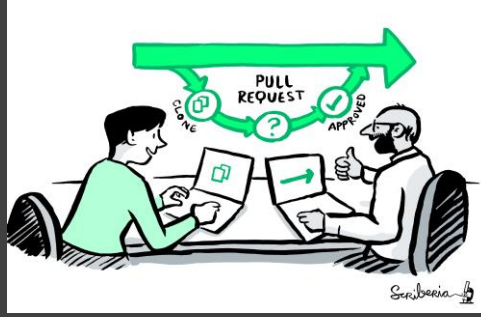
Combined Efforts



Engagements



Equitable Participation



Open Recognition



Co-Creation

Opportunities for connections



*Co-working Calls &
Collaboration Cafés*

bit.ly/turingway



Biannual Book Dash Events

Screenshots from The Turing Way Book Dashes

@ekaroune, @vickyhellon, @turingway, CC-BY 4.0, Zenodo: <https://doi.org/10.5281/zenodo/6849036>

Fireside Chat: Monthly Informal Events

Navigating Growth and Scale to Sustain Open Communities

29 July 2022, 15:00 UTC

Hosted by



Register on Eventbrite



Selena Yang

Co-founder and Coordinator
of Geochicas



Patrick Mineault

Founder, xoom Consulting
for neuroAI



Geoffrey Kateregga

Community Manager,
Humanitarian OpenStreetMap
Team



Alycia Crall

Director of Community,
The Carpentries



Anne Lee Steele

Community Manager,
The Turing Way

Fireside Chat Series

The July 2022 event is hosted with The Carpentries organisation. Fireside Chat series features people, ideas & projects in open and reproducible research.



bit.ly/turingway

29 July 2022, 15:00 UTC

Organisation-wide collaboration

Afterword

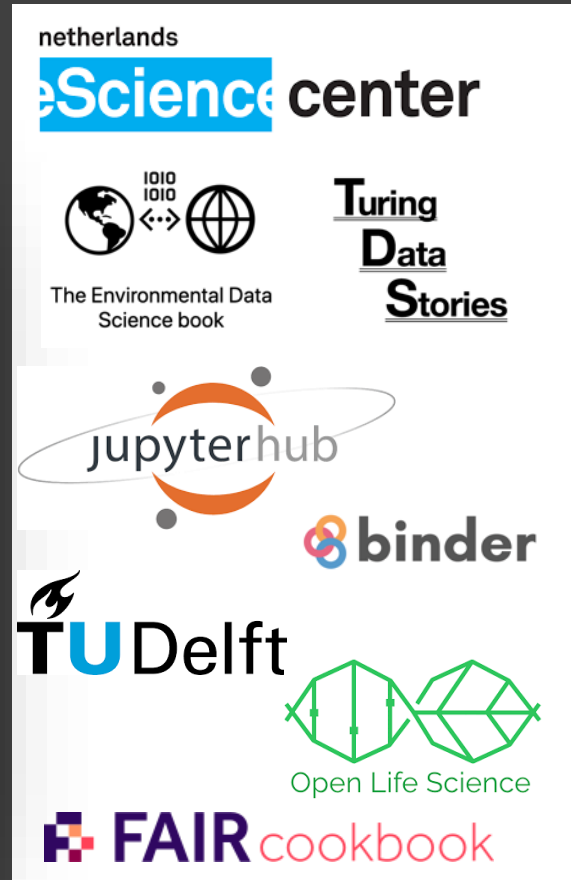
Glossary

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



Online book: <https://the-turing-way.netlify.app/community-handbook>

@ekaroune, @vickyhellon, @turingway, CC-BY 4.0, <https://doi.org/10.5281/zenodo/6849036>

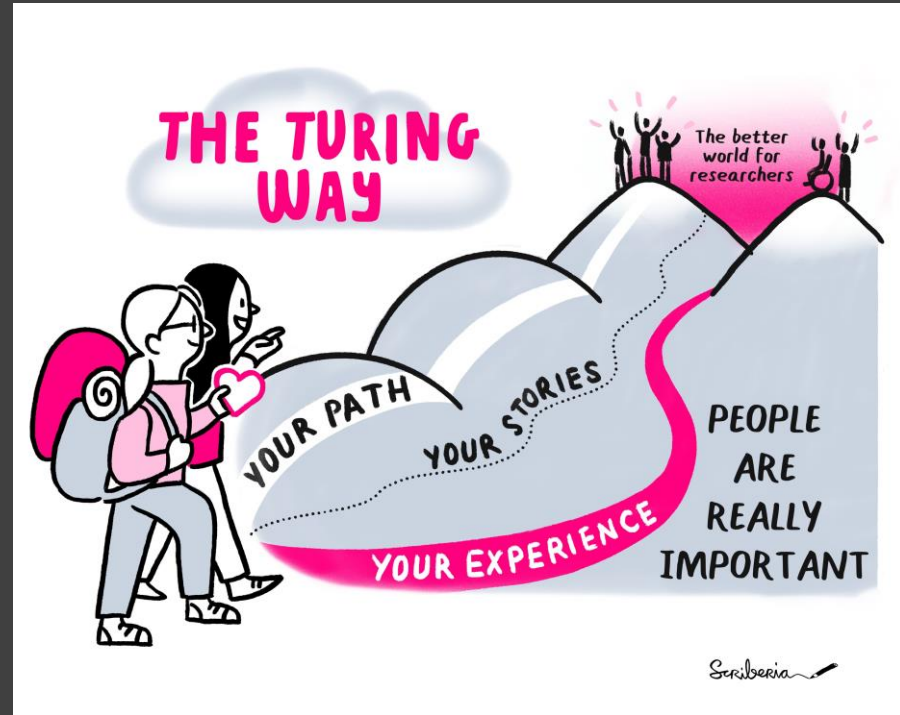
Evidence of successful replication or extension

- **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

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!



Acknowledgements & Links

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>

Turing-Roche Strategic Partnership

- **Website:** <https://www.turing.ac.uk/research/research-projects/alan-turing-institute-roche-strategic-partnership>

Turing-RSS Health Data Lab

- **Website:** <https://www.turing.ac.uk/research/research-projects/turing-rss-health-data-lab>
- **Follow us on twitter:** https://twitter.com/turingrss_hdlab

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