

The Alan Turing Institute

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Projects, Teams & Resources

Malvika Sharan

Senior Researcher – Open Research
Tools, Practices and Systems



The Alan Turing Institute

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The national institute for data science and
artificial intelligence (AI)

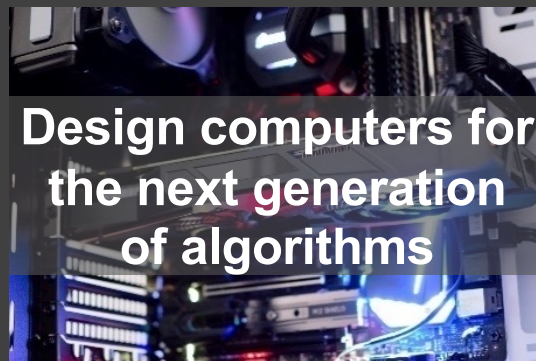
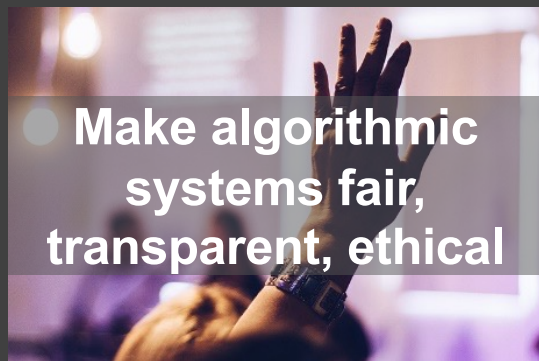
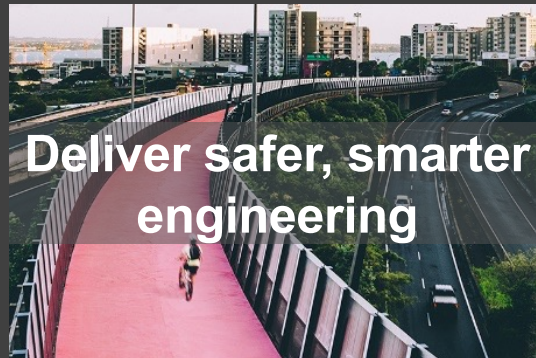
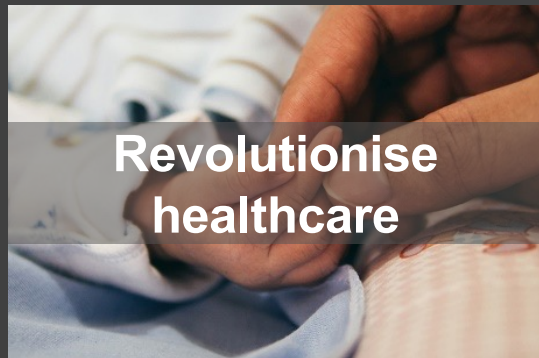


Institute goals

- Advance world-class research & apply it to real-world problems
- Train the leaders of the future
- Lead the public conversation on data science and AI

Challenges

Advance data science and artificial intelligence to...



Our university network



Our partners and collaborators



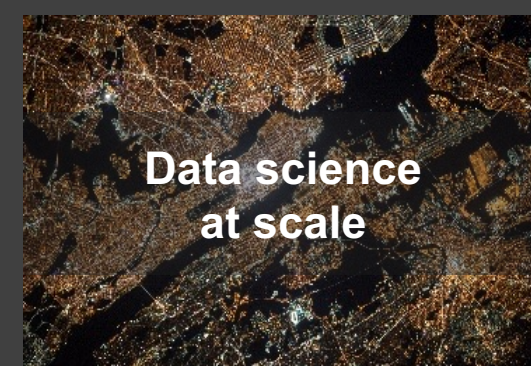
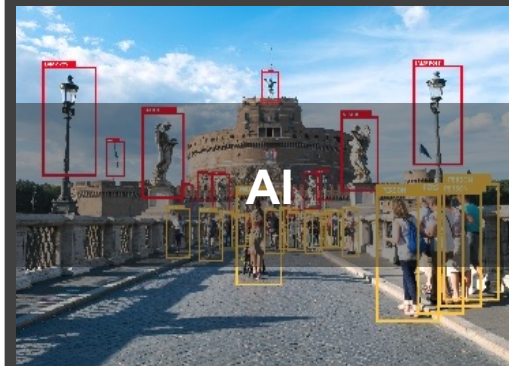
The Turing's Research Programmes

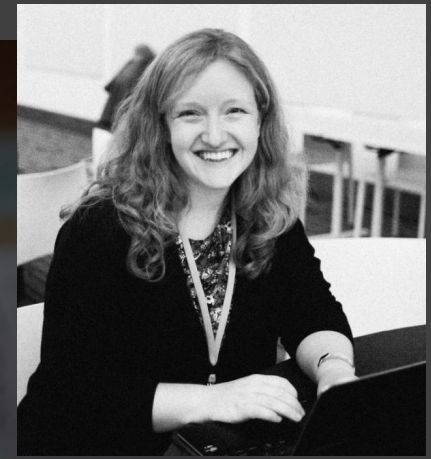


Sector specific



Cross-cutting





Kirstie Whitaker
Programme Director

[Home](#) + [Research](#) + [Research programmes](#)

Tools, practices and systems

Building open source infrastructure to empower a global, decentralised network of people who connect data with domain experts

Tools, Practices and Systems

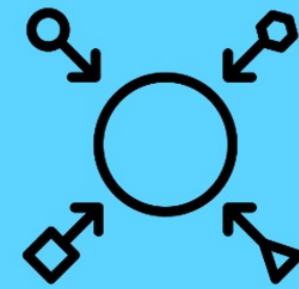
- Accelerate innovation through open-source tools
- Establish practices for reproducible and reusable workflows
- Optimising high-performance computing and secure data environment
- Democratise access to data science and AI



Trust



Transparency



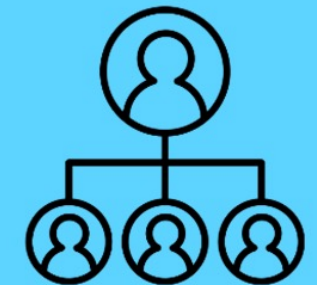
Inclusivity



Integrity



Respect



Leadership

Tools, Practices and Systems: Notable Projects



'The Turing Way' – A handbook for reproducible data science



DECOVID



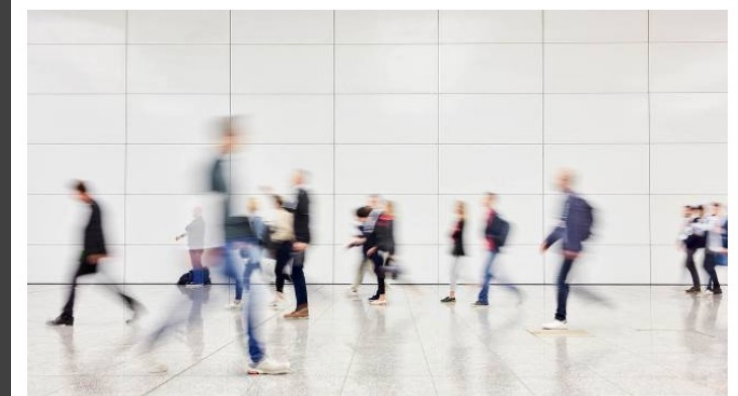
Raphtory: A practical system for the analysis of dynamic graphs



Data safe havens in the cloud



Turing data stories



QUIPP – Quantifying utility and preserving privacy in synthetic data sets



Research Reproducibility

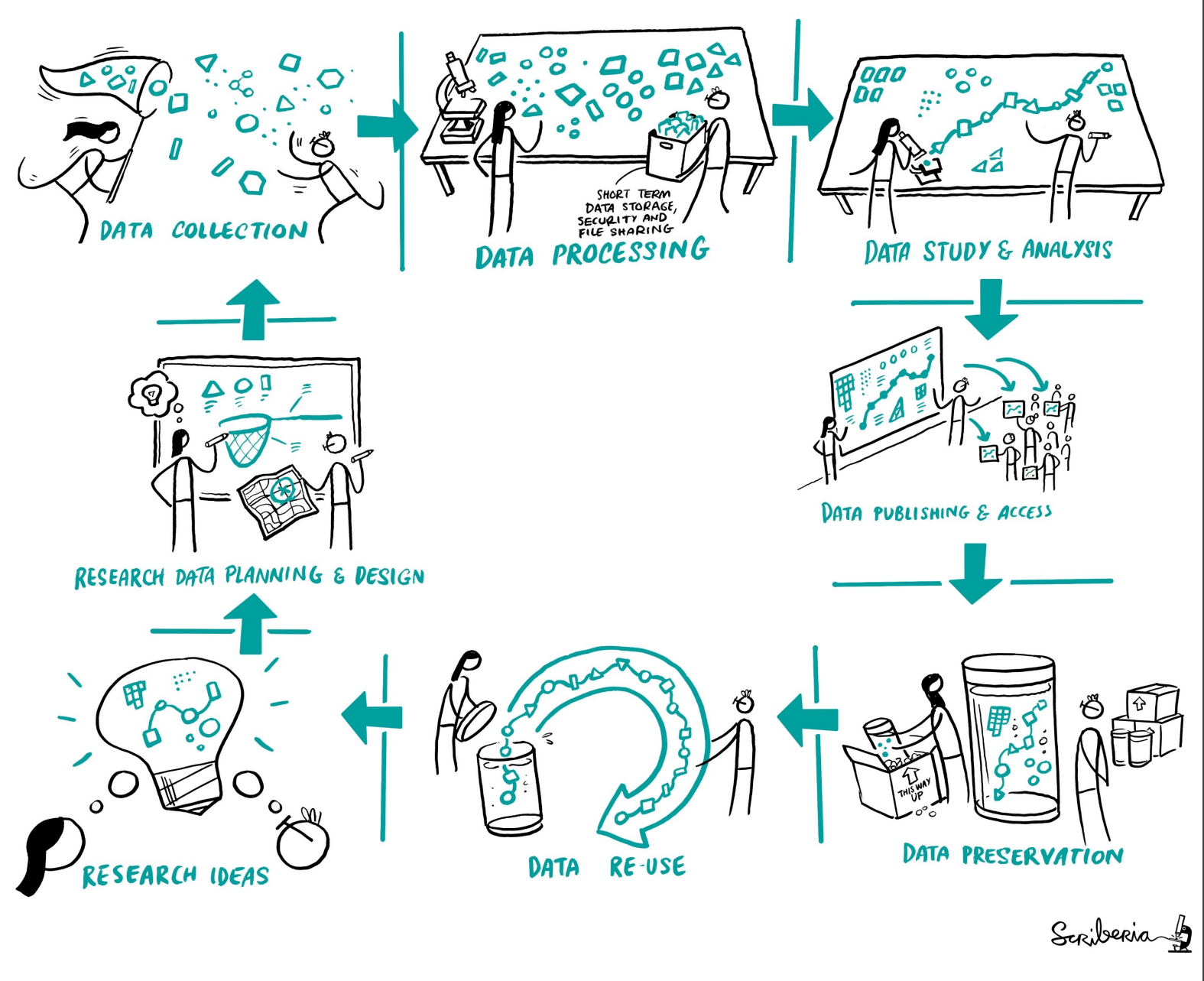
Reproducible research save valuable time in verifying and building upon widely beneficial data and AI solutions.



		Data	
		Same	Different
Analysis	Same	Reproducible	Replicable
	Different	Robust	Generalisable

Reproducibility

		Data	
		Same	Different
Analysis	Same	Reproducible	Replicable
	Different	Robust	Generalisable



Scriberia

The Turing Way



**The
Alan Turing
Institute**

An Open Source project that involves and supports its **diverse community** to make data science **reproducible, ethical, collaborative and inclusive** for everyone.

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

@malvikasharan, @turingway, CC-BY 4.0, The Turing Way, DOI: 10.5281/zenodo.10.5281/zenodo.5568007

Guide for Reproducibility

Guide for Reproducible Research

- Overview
- Open Research
- Version Control
- Licensing
- Research Data Management
- Reproducible Environments
- BinderHub
- Code quality
- Code Testing
- Code Reviewing Process
- Continuous Integration
- Reproducible Research with Make
- Research Compendia
- Credit for Reproducible Research
- Risk Assessment
- Case Studies

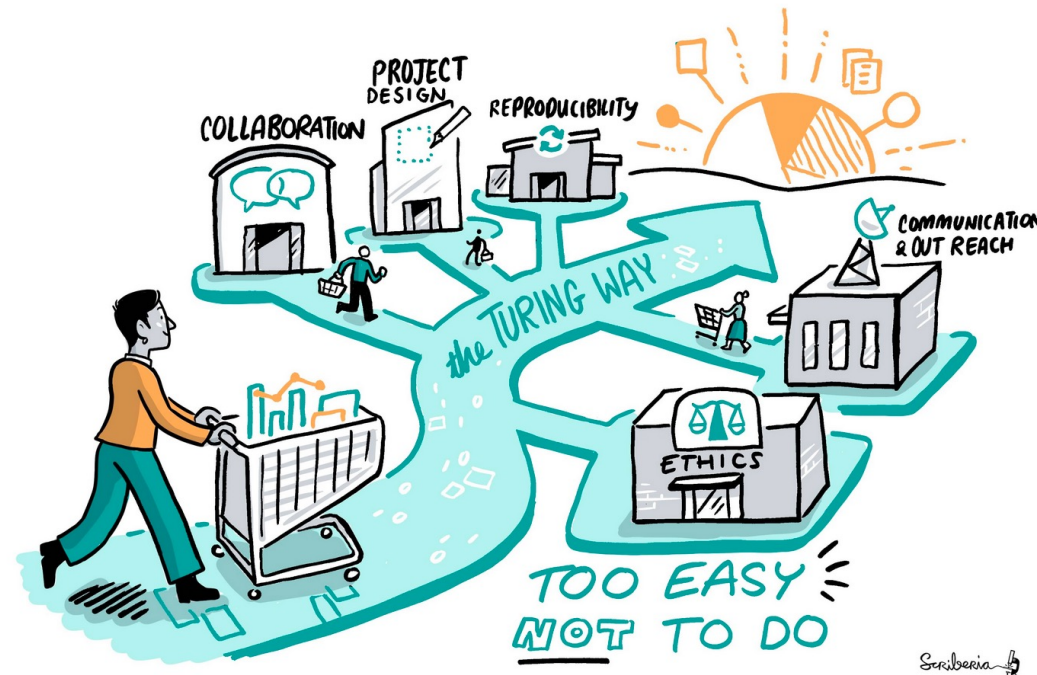
Welcome

The Turing Way is an open source community-driven guide to reproducible, ethical, inclusive and collaborative data science.

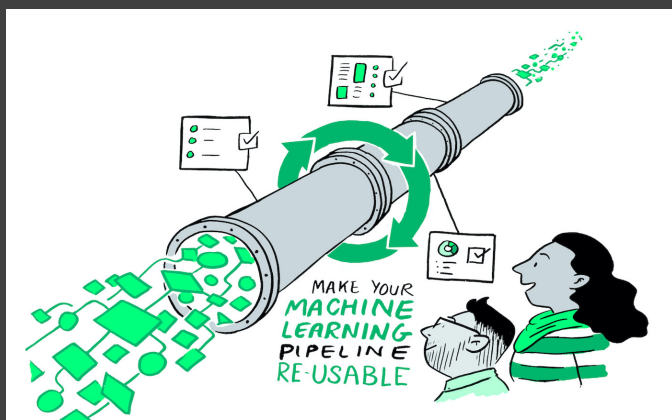
Our goal is to provide all the information that data scientists in academia, industry, government and the third sector need at the start of their projects to ensure that they are easy to reproduce and reuse at the end.

The book started as a guide for reproducibility, covering version control, testing, and continuous integration. However, technical skills are just one aspect of making data science research "open for all".

In February 2020, *The Turing Way* expanded to a series of books covering reproducible research, project design, communication, collaboration, and ethical research.



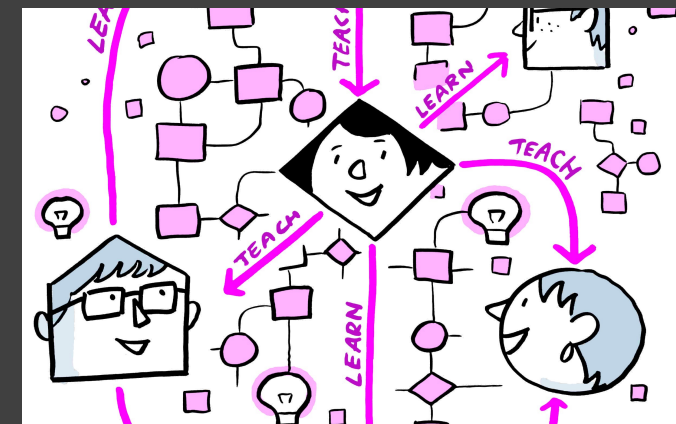
The Turing Way Guides



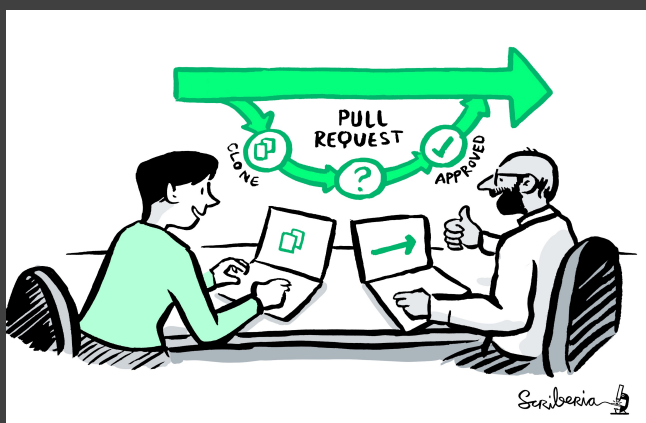
Reproducibility



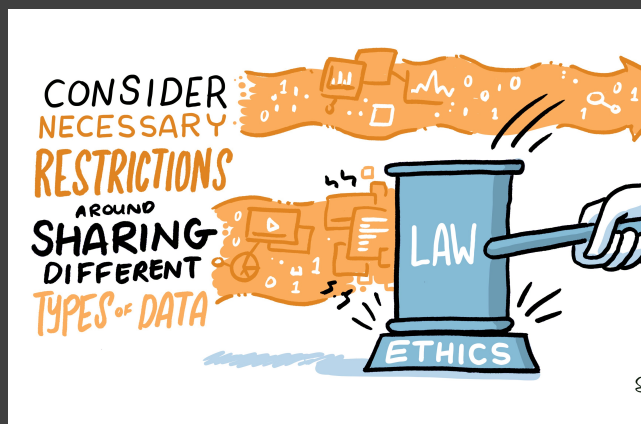
Project Design



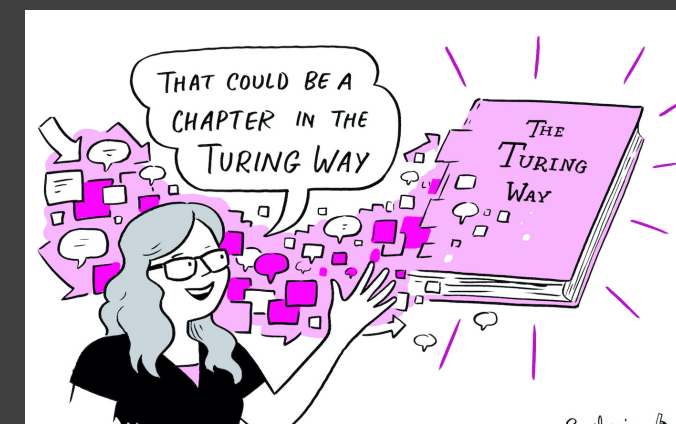
Communication



Collaboration



Ethical Research



Community Handbook

Notable Impacts Beyond the project

- 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](#))
- Impact on nation-wide projects like at [Office for National Statistics](#)
- Cited by 10+ peer-reviewed articles & 10+ open source projects

AI for Science and Government

- **Crick-Turing Partnership:** Biomedical Data Science Awards and Training for Leaders
- **Roche Strategic partnership:** Generating data insights using advanced analytics
- **Interest Group:** Omics data generation and analysis
- **Measuring policy impact in the COVID-19 crisis and building resilience against future shocks**



Prof Ben McArthur

Director of AI for Science and Government, Deputy Programme Director for Health and Medical Sciences, and Turing Fellow

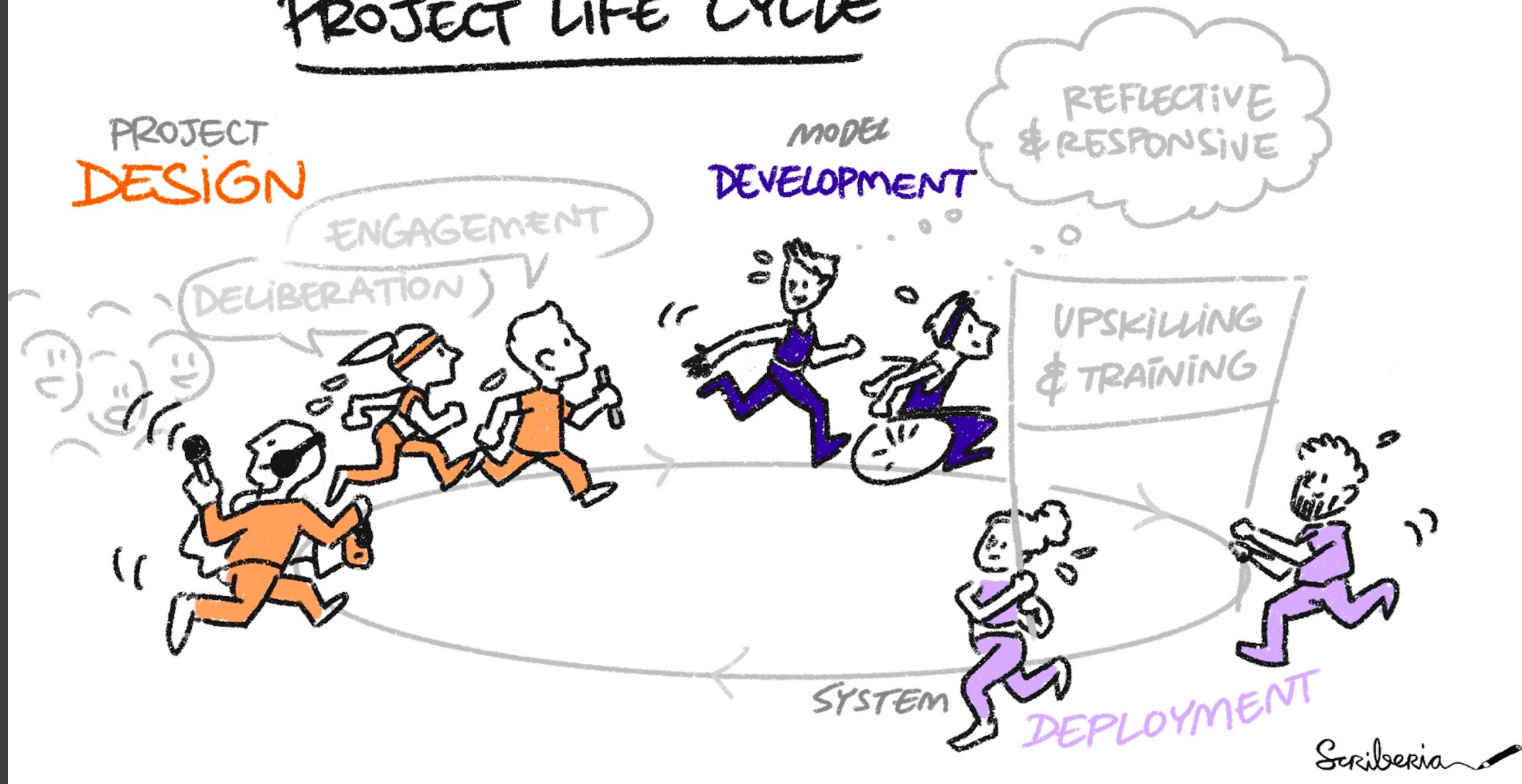
The Alan Turing Institute


Ethical Research

Researchers in data science have an obligation to consider the ethical standards and their impact on society.



PROJECT LIFE CYCLE



A woman with long dark hair and glasses is seen from the side, looking at a wall covered in numerous colorful sticky notes. The notes are in various colors like yellow, pink, blue, and green, and some have handwritten text. The scene is dimly lit, with the woman's face partially in shadow.

Home + Research + Research programmes

Public policy

Working with policy makers on data-driven public services and innovation to solve policy problems, and developing ethical foundations for data science and AI policy-making

Public Policy: Programme Challenges

- Use data science and artificial intelligence to **inform policy-making**
- Improve the provision of **public services**
- **Build ethical foundations** for the use of data science and AI in policy-making
- **Contribute to policy** that governs the use of data science and AI



Prof Helen Margetts,
Programme Director



Dr David Leslie,
Ethics theme Lead



Dr Cosmina Dorobantu,
Deputy Programme
Director



Dr Christopher Burr,
Turing Fellow

Understanding AI Ethics & Safety

A guide on the topic of **AI ethics and safety** in the public sector.

- Highlights harms caused by AI systems and proposes concrete, operationalisable measures to counteract them.

*Join the **Facilitating responsible participation in data science** group.*



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Ethics theme Lead



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Deputy Programme
Director



Dr Christopher Burr,
Turing Fellow

@malvikasharan, @turinginst, <https://www.turing.ac.uk/research/research-programmes/public-policy/>,

Special Interest Group: <https://www.turing.ac.uk/research/interest-groups/facilitating-responsible-participation-data-science>

Public Policy: Notable Projects



Learning machines – infrastructure for augmented intelligence →



PATH-AI: Mapping an intercultural path to privacy, agency, and trust in human-AI ecosystems →



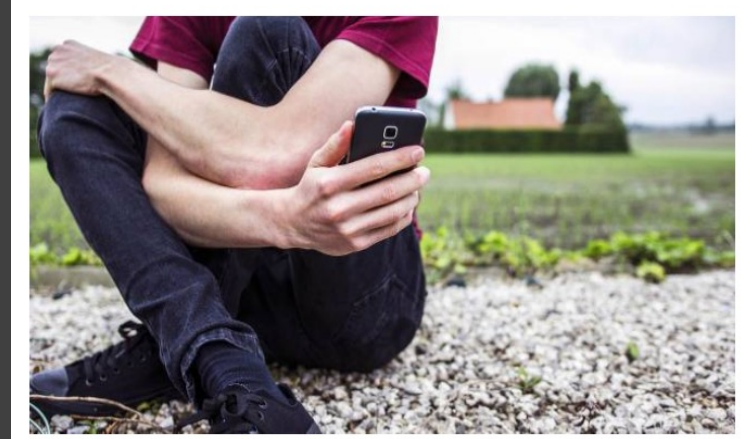
Building an ethical framework for data science and AI in the criminal justice system →



Statistics and the law: Probabilistic modelling of forensic evidence →

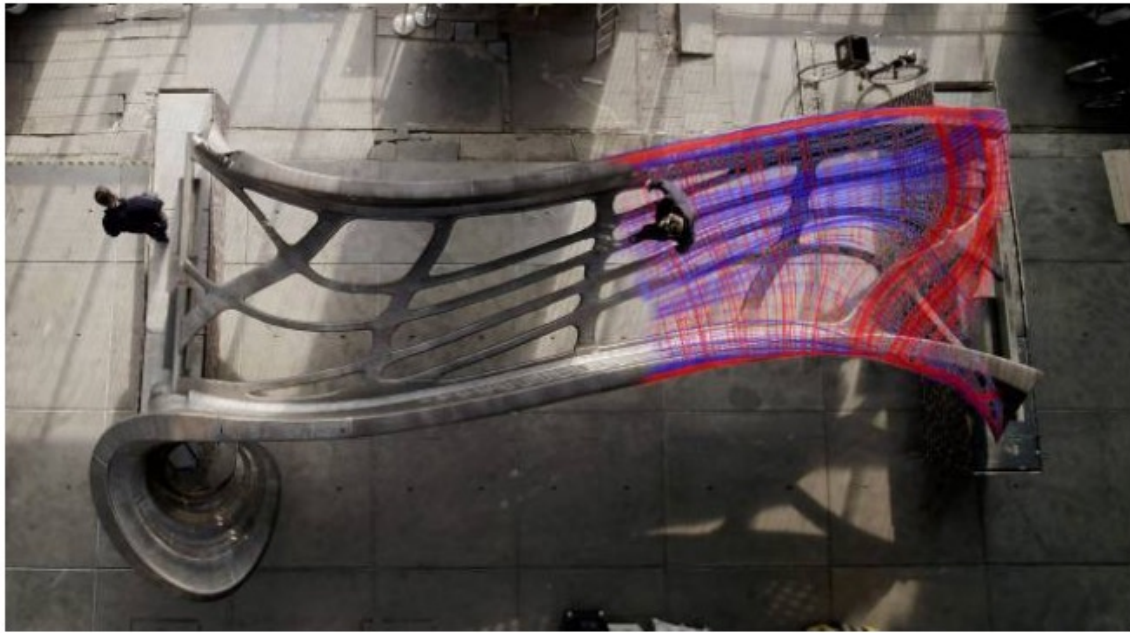


Vulnerability to misinformation during COVID-19 →



Hate speech: measures and counter-measures →

Impact Stories: Selected Examples



Bridging the gap between physical and digital



Ensuring quality in AI healthcare technologies



Impact Stories: Selected Examples

Home + Research + Impact stories

Bridging the gap between physical and digital

The Turing's data-centric engineering programme and its collaborators are unlocking insights into the world-first 3D printed steel bridge, using innovative data science techniques and 'digital twin' technology



Impact Stories: Selected Examples

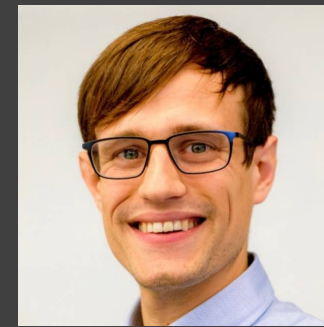
Home + Research + Impact stories

Ensuring quality in AI healthcare technologies

A project co-funded by the Turing has developed the first international guidelines for clinical trials involving AI

Training, Skills, Partnership Teams

- Nation's Data Science and AI Education
- Turing Doctoral Studentship, Turing Internship Network, Enrichment scheme
- Research Engineering Group (REG)
- Data Study Group, industry engagement
- Partnerships for health & medical sciences
- Women in data science and AI – Hub
- Events: <https://www.turing.ac.uk/events>



Dr Matthew Forshaw
National Skills Lead



Mishka Nemes,
Training Officer



Dr Martin O'Reilly,
Director REG



Jules Manser,
Data Study Group



Katrina Payne,
Partnership Dev Lead



Dr Erin Yong,
Research Fellow

Acknowledgement

- Dr Kirstie Whitaker, Tools, Practices and Systems
- Prof Ben McArthur, AI for Science and Government, Health and Medical Sciences
- The Turing Way - Project & Community: <http://bit.ly/turingway>
- Dr David Leslie, Public Policy Team
- Donna Brown, Director of Academic Engagement
- Impact Stories: <https://www.turing.ac.uk/research/impact-stories>
- Artwork by Scriberia: <https://doi.org/10.5281/zenodo.3332807>