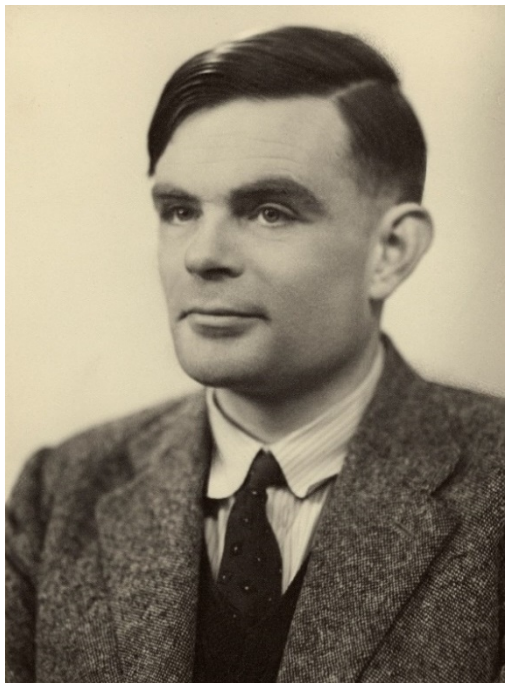


Building on a strong scientific legacy



- Alan Turing's pioneering work in theoretical and applied mathematics, engineering and computing are considered to be the key disciplines comprising the field of data science.
- *"I propose to consider the question, "Can machines think?"..."*

In 1950 Turing published his seminal paper, *Computing Machinery and Intelligence*, which is credited with laying the foundations for the development and philosophy of artificial intelligence.

Founding the Institute

“We will found The Alan Turing Institute to ensure Britain leads the way again in the use of big data and algorithm research”

George Osborne, Chancellor of the Exchequer
Budget Speech, March 2014

**The
Alan Turing
Institute**

EPSRC
Engineering and Physical Sciences
Research Council

Network of industry,
charity, government
partners

Network of
university members

Strategic
government
investment

The goals of the Institute

Innovate and develop world-class research in data science and artificial intelligence

Apply our data science research to real-world problems, supporting the creation of new products, services, and jobs

Train the next generation of data science and artificial intelligence leaders

Advising policy-makers and shaping the public conversation around data

The Alan Turing Institute

The national institute for data science
and artificial intelligence

Our university network



The Institute's partners and collaborators



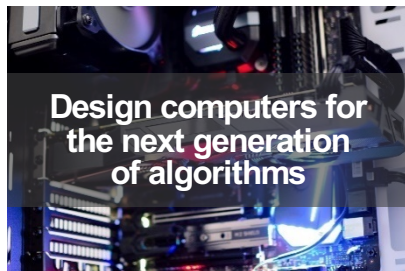
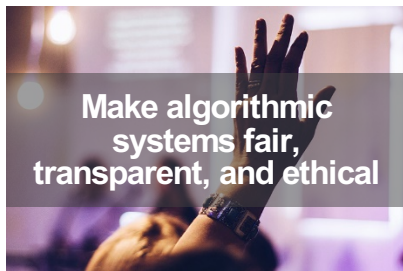
Research

The Turing's science areas



Challenges

Advance data science and artificial intelligence to...



The goal of the Institute



Data Study Groups

Week-long data science sprints

Day 1: Problems are presented by partners

Researchers branch into groups for each problem and discuss different approaches

Day 2-4: Brainstorming, modelling and problem solving

Collaboration and discussion with industrial representative

Day 5: Progress and recommended routes forward are presented.

Output: Report and possible extension of collaboration

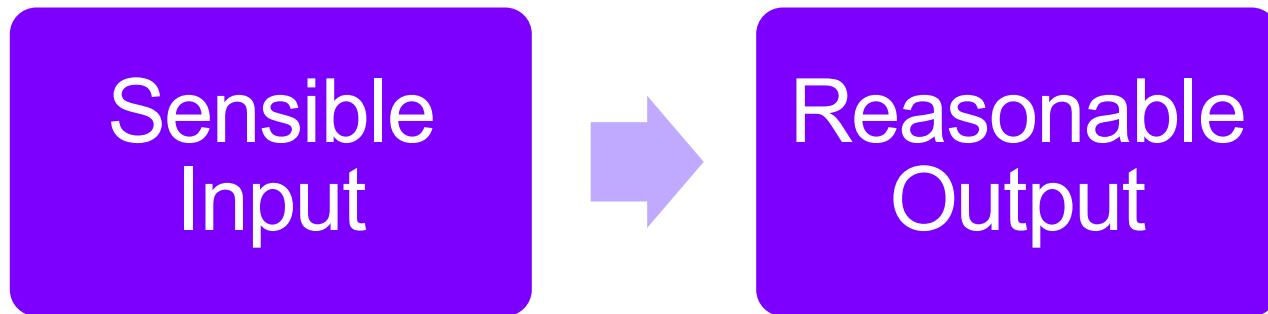


Research Engineering: The Craftsperson and Scholar



The State of Research Software

The SIRO Problem



PhDWare

- Don't look if anyone's done it before
- Code till it works
- Generate a figure
- Throw it away

Labware

- Understood by one genius
- Implements great science, now
- FORTRAN in any language
- Code not engineered for readability
- Can't add new science

ConsultantWare

- Little understanding of the science
- Overengineered
- Unmaintainable by the research group

Middleware

- Generalise a part of the research problem
- Publish at an eScience conference
- Have no users in the research community

HPCWare

- Get a 5% improvement in performance
- On a particular architecture
- Publish a scaling graph
- Selection against:
 - Readability
 - Maintainability
 - Adaptability



Research software engineers

The Craftsperson and scholar



Research Software Engineers



Our Story

- 2014: Manchester group
- 2015: Southampton and Cambridge Groups
- Jan 2016: EPSRC awards first Research Software Engineering Fellowships
- 2016: Bristol, Sheffield Groups
- September 2016: First RSE conference, 202 attendees, 14 countries

Our Story

- RSE Germany and RSE Netherlands founded
- 2017: Leicester, Imperial College groups.
- September 2017: Second conference, 224 attendees, 12 countries
- Late 2017: UKRSE formally incorporated as a charity
- Late 2017: Second round of UK RSE fellows appointed
- October 2017: Australia and New Zealand RSE founded

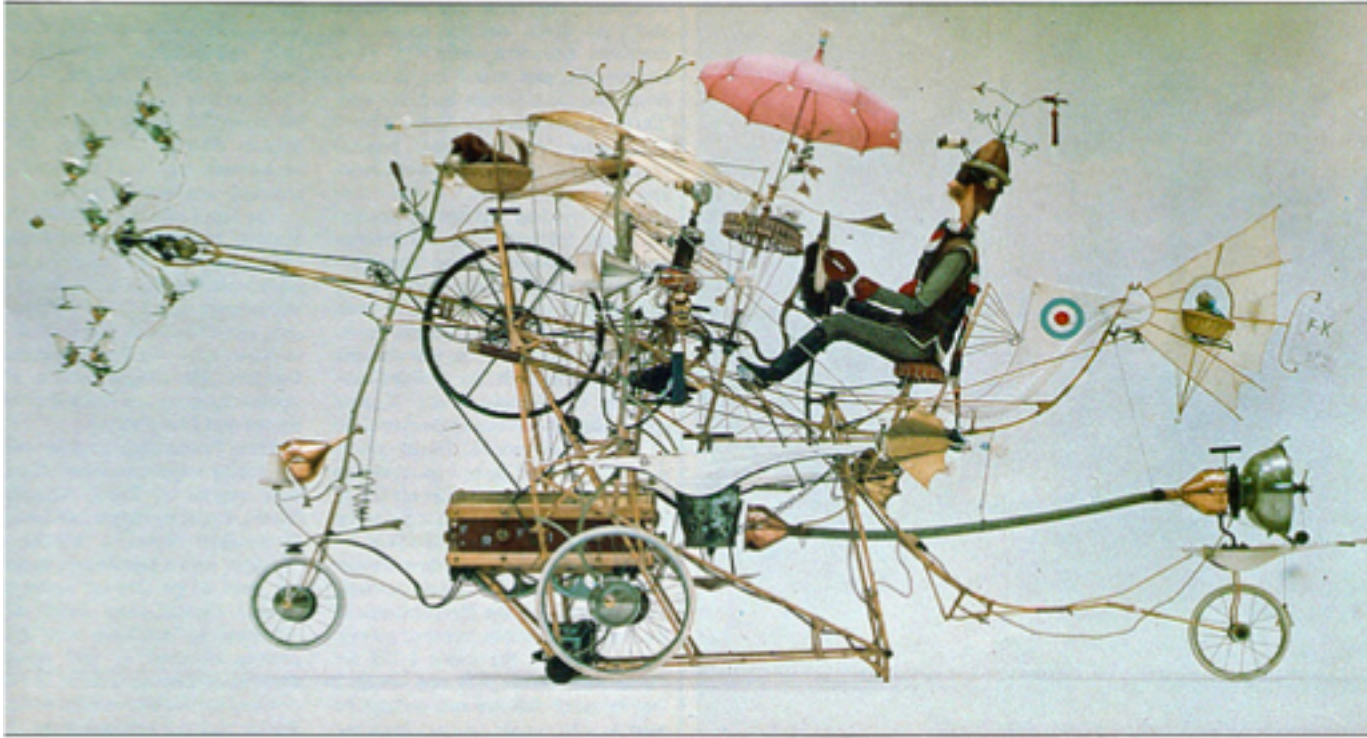
Readable, reliable, and reproducible

We help make code:

- Last beyond the end of the grant that funded it
- Be usable by someone other than the PhD student who wrote it
- Have a standard of correctness better than "the graph looks about right"

Lessons learned

Sell performance, deliver reproducibility



Use appropriate technology



Look beyond the usual



Make space to learn



Organisational judo



Computational Science as a Service



Unicorn farming



Why you should be a research engineer

- Read papers
- Write code

**turing.ac.uk
@turinginst**