

Open Science and Data Management: A TU Delft Approach



Outline of my talk

- Background to TU Delft
- The case for open science/data, research reproducibility and barriers to overcome
- What does TU Delft do to support researchers? - case study

Where is TU Delft? (Delft University of Technology)



Where is TU Delft? (Delft University of Technology)



Delft: Impressions



The TU campus

 **TU**Delft Beeldbank



TU Delft - statistics

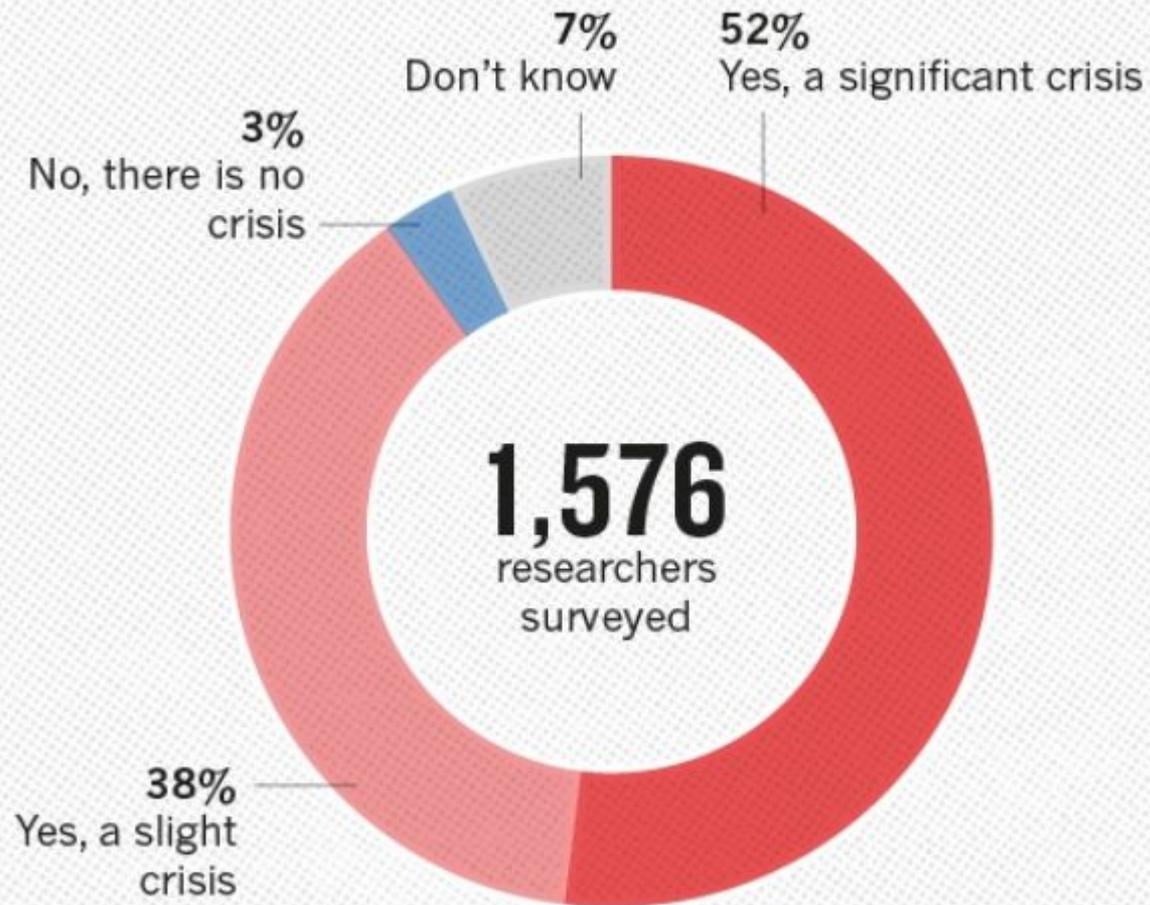
- Research intensive:
 - 11th top beneficiary of H2020 funding in 2017, rankings QS, Times higher ed(52)
- 8 Faculties
- 5,000 employees
 - including PhD students
- 19,000 students (Bachelor & Master)
- International (more than 50 countries represented)

Why Open Science, Data Sharing and Research Reproducibility?

Do you think there is a
reproducibility crisis in science?

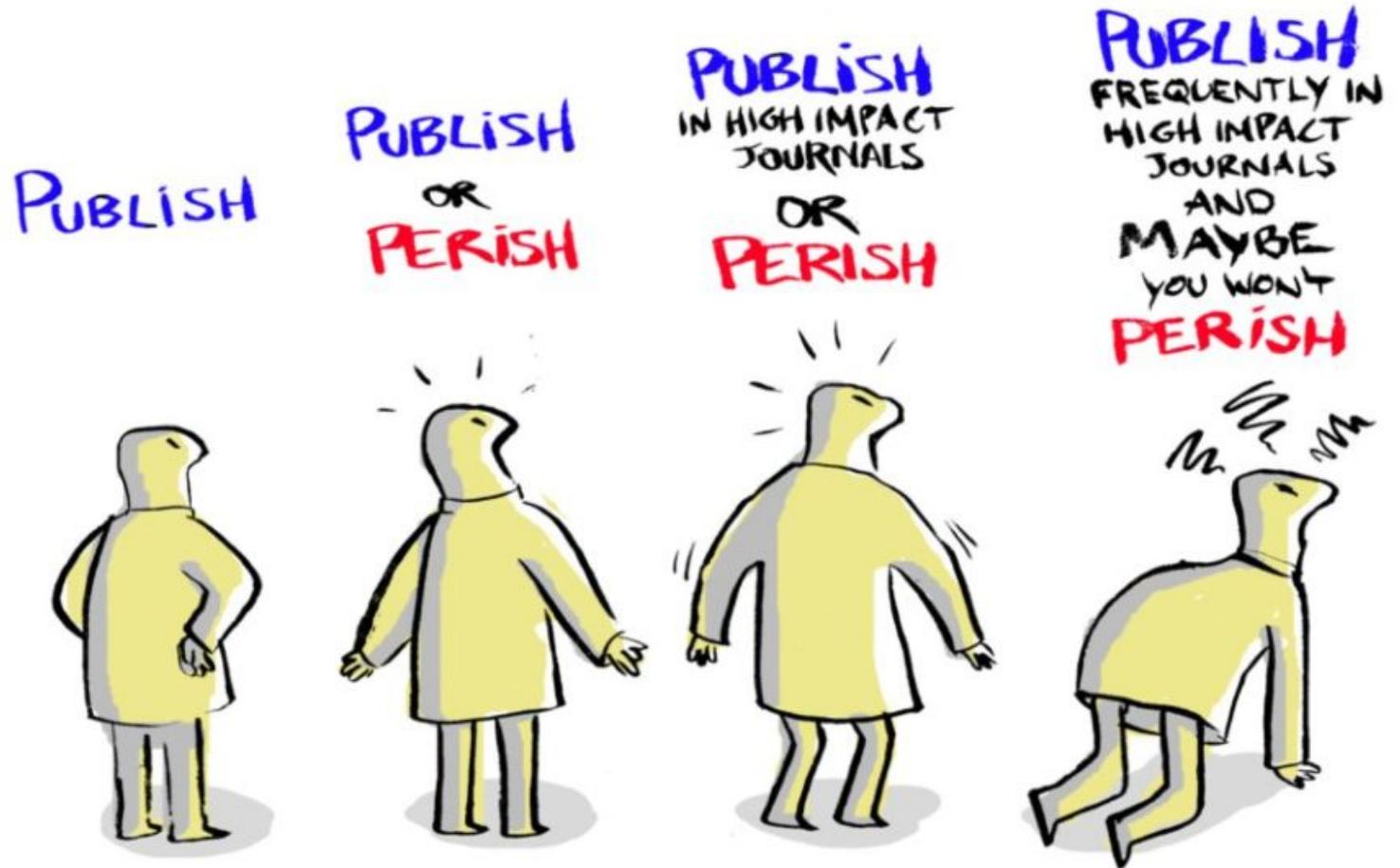


IS THERE A REPRODUCIBILITY CRISIS?



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THE EVOLUTION OF ACADEMIA



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Copyright:

<https://velica.deviantart.com/art/Publish-or-Perish-645355248>

Pressure to publish positive results...

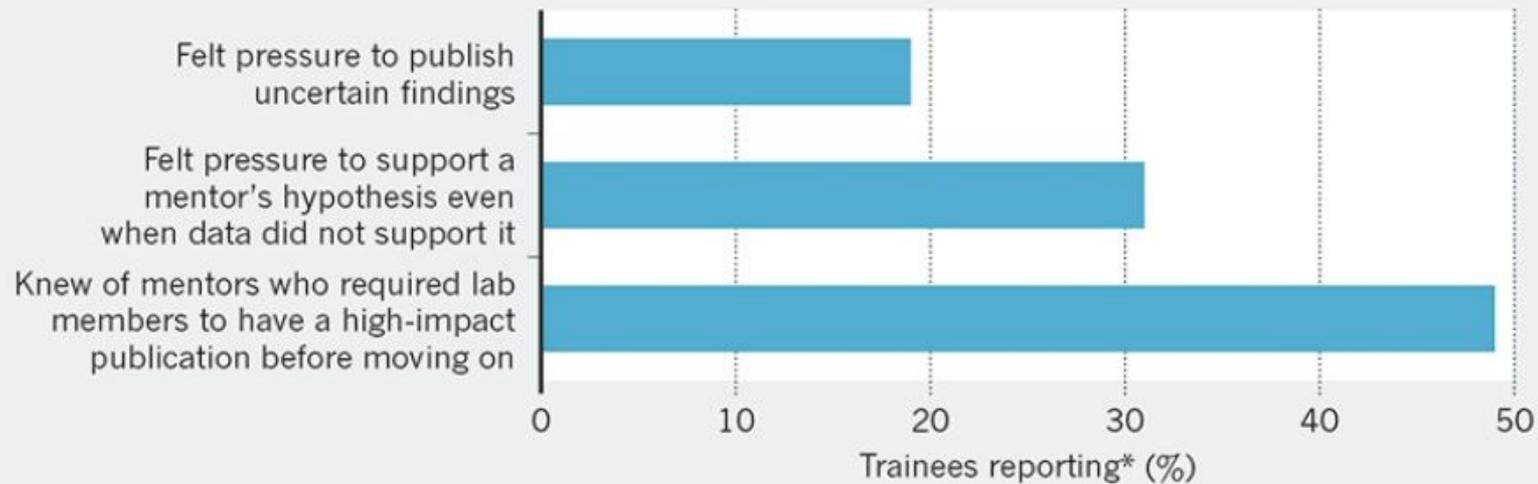
- Design the study
- Collect data
- Analyze data as prespecified
- Oops! $P > 0.05$?
 - *Torture data until it confesses*
- Then, and only then... write the manuscript



“In many laboratories, the incentives to be first can be stronger than the incentives to be right.”

PRESSURED FINDINGS

A survey of US biomedical trainees suggests that the push to publish spurs unreliable results.



*Online survey of ~140 trainees at the MD Anderson Cancer Center in Houston, Texas.

Some consequences

Report finds massive fraud at Dutch universities

Investigation claims dozens of social-psychology papers contain faked data.

Ewen Callaway

When colleagues called the work of Dutch psychologist Diederik Stapel too good to be true, they meant it as a compliment. But a preliminary investigative report (go.nature.com/tqmp5c) released on 31 October gives literal meaning to the phrase, detailing years of data manipulation and blatant fabrication by the prominent Tilburg University researcher.



<https://www.nature.com/news/2011/111101/full/479015a.html>

We all know opening research data is good!



What (according to researchers) are the key barriers to FAIR and Open Science/ Data Sharing?



Similar question asked to 600 active researchers in psychology

Invited Forum: Challenges in Making Data Available
Empirical Article

aps
ASSOCIATION FOR
PSYCHOLOGICAL SCIENCE

Data Sharing in Psychology: A Survey on Barriers and Preconditions



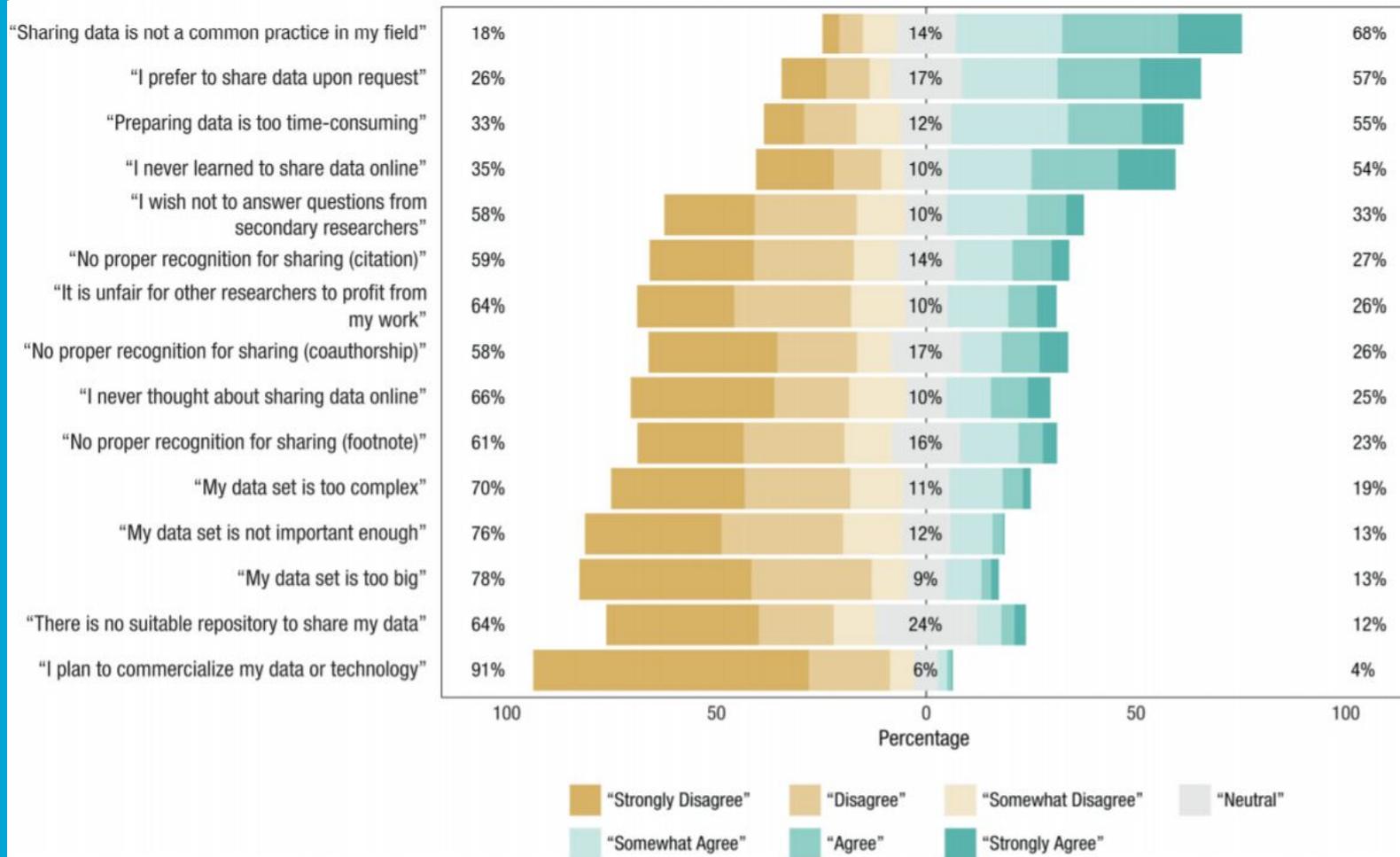
Bobby Lee Houtkoop¹, Chris Chambers², Malcolm Macleod³, Dorothy V. M. Bishop⁴, Thomas E. Nichols^{5,6,7}, and Eric-Jan Wagenmakers¹

¹Psychological Methods Programme Group, University of Amsterdam; ²Brain Research Imaging Centre (CUBRIC), School of Psychology, Cardiff University; ³Centre for Clinical Brain Sciences, University of Edinburgh; ⁴Department of Experimental Psychology, University of Oxford; ⁵Oxford Big Data Institute, Li Ka Shing Centre for Health Information and Discovery, Nuffield Department of Population Health, University of Oxford; ⁶Wellcome Centre for Integrative Neuroimaging, FMRIB, Nuffield Department of Clinical Neurosciences, University of Oxford; and ⁷Department of Statistics, University of Warwick

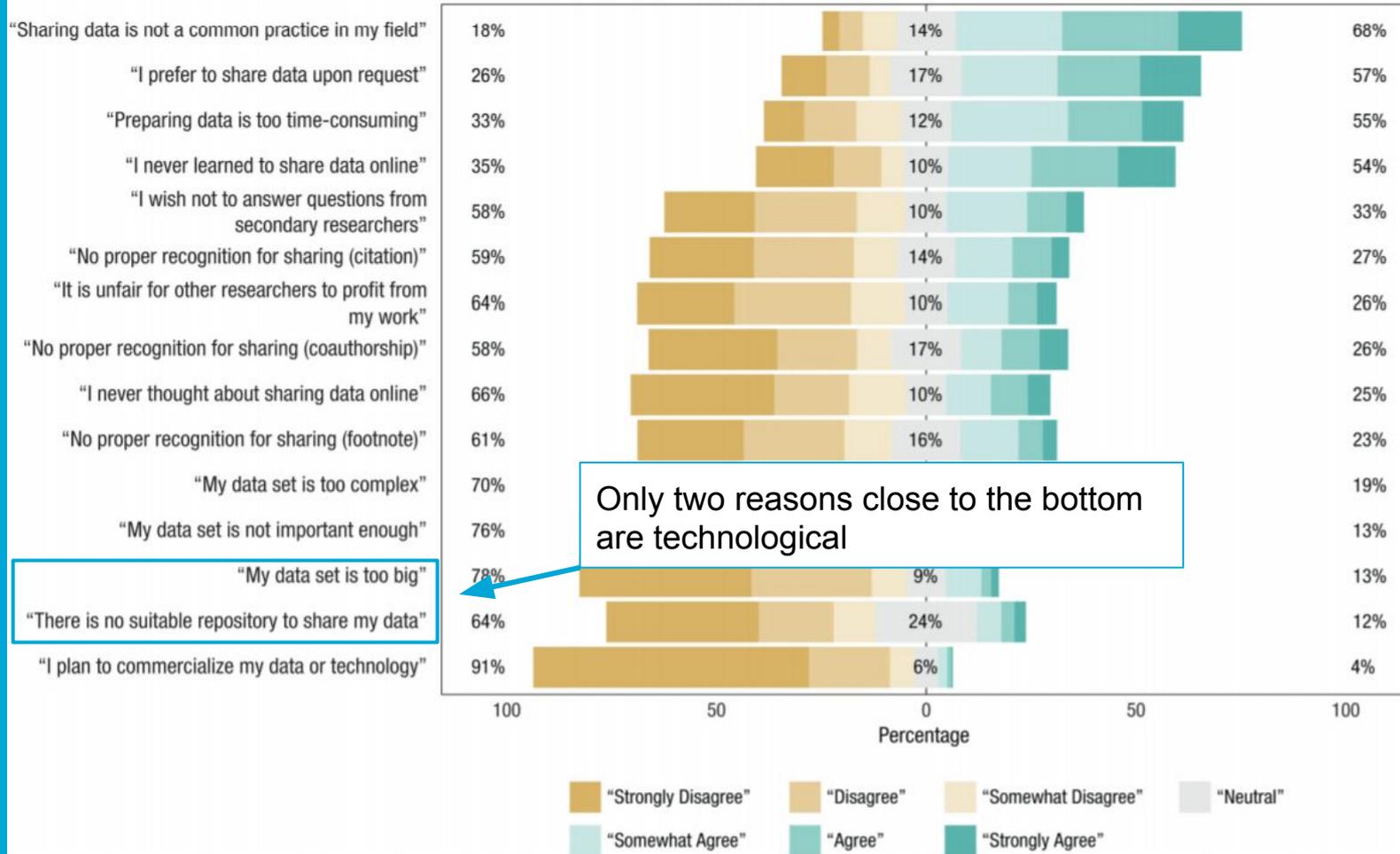
Advances in Methods and
Practices in Psychological Science
2018, Vol. 1(1) 70–85
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sagepub.com/journalsPermissions.nav
DOI: 10.1177/2515245917751886
www.psychologicalscience.org/AMPPS

 SAGE

To what extent do you agree with the following statements about barriers related to data sharing?



To what extent do you agree with the following statements about barriers related to data sharing?



Similar findings in other reports (from other disciplines), e.g.

- Life sciences, social sciences and humanities:
 - Van den Eynden et al. (2016)
 - <https://doi.org/10.6084/m9.figshare.4055448.v1>
- All disciplines:
 - Johnson et al. (2016)
 - <http://doi.org/10.5281/zenodo.177856>

What does this say:

- The main obstacles to Open Science and FAIR Data are **cultural, not technological**



The TU Delft Approach

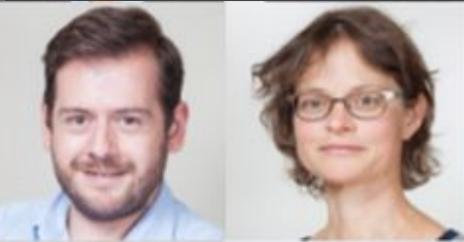


Four major principles:
Excellence, Impact,
Engagement and **Openness**



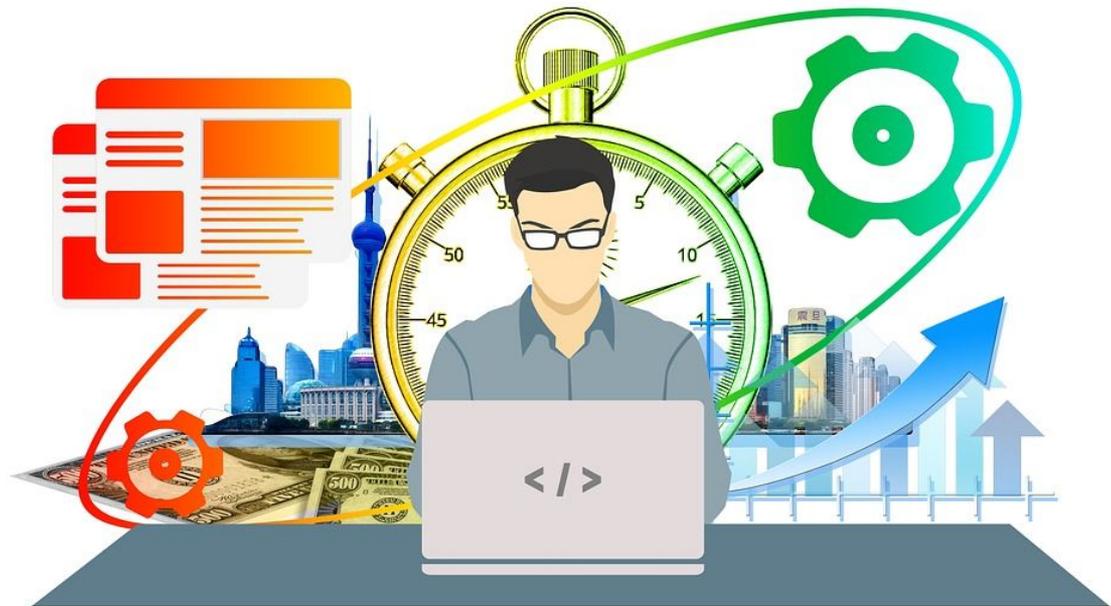
Impact for a
better society

TU Delft Strategic Framework 2018-2024



Data Stewardship at TU Delft

Aim: to develop mature practices for research data management across the campus.

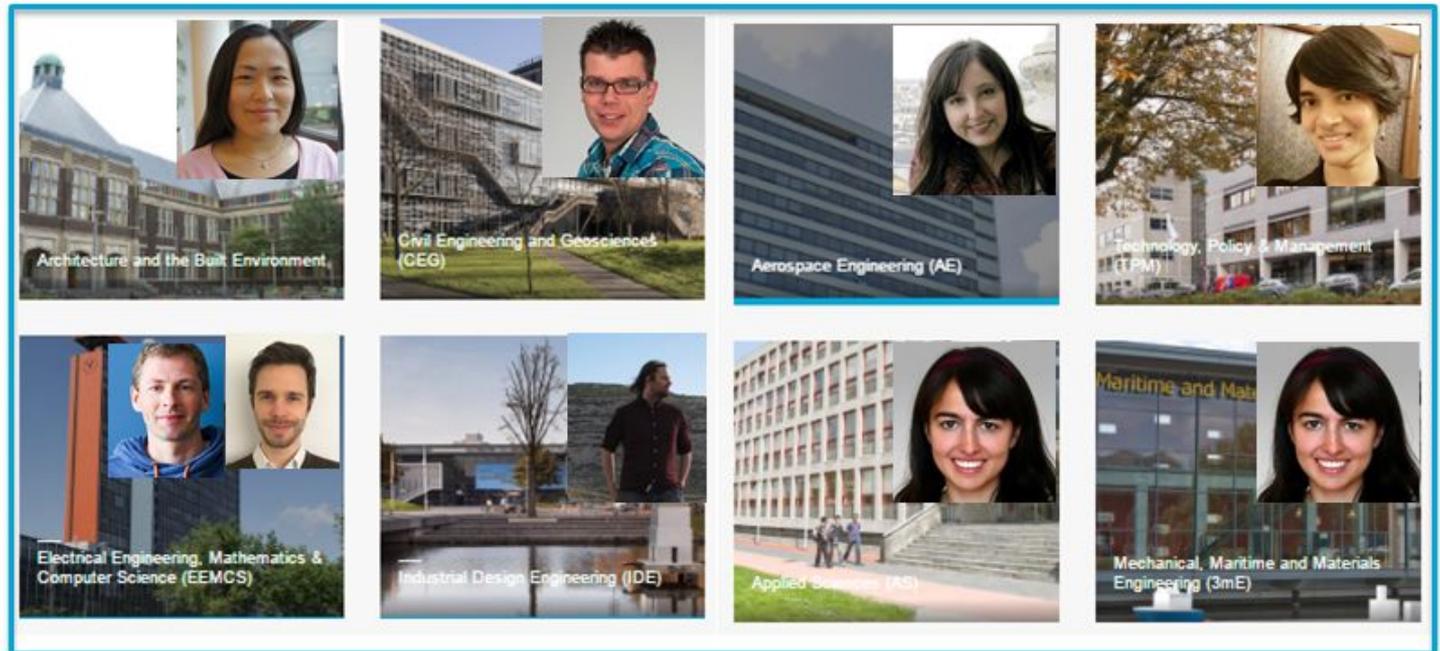


Good data management is a necessary prerequisite to reproducible research



Research is central: importance of disciplinary support

Subject-specific Data Steward at every Faculty



Training in data management provided:

<https://openworking.wordpress.com/2017/09/18/training-for-data-stewards/>

What do the Data Stewards do?



- First contact points for any data questions
- Advocacy and training

Integration of and collaboration between service providers



Key principles behind the project

- Research is central
- Data stewards are consultants, not police!
 - Objective: improve culture (not compliance)



Data Stewardship – working openly

Open Working

An Experiment in Open Working from 4TU.Centre for Research Data & TU Delft Research Data Services (Note! This is a test site)

HOME

ABOUT OPEN WORKING AT TU DELFT

DRAFT DATA MANAGEMENT PLAN CATALOGUE

DATA STEWARDSHIP

CONTACT

Data Stewardship

This page gathers all the news and updates about the Data Stewardship project for improved navigation and visibility.

Project deliverables

- [Data Management survey results at the Faculty of Aerospace Engineering](#) – by Heather Andrews, published on 14 February 2018
- [Do as you preach: results of 2017 data management survey now published](#) – by Jasper van Dijck, published on 7 February 2018
- [Views on Data Stewardship – report of preliminary findings at TPM faculty](#) – by Marta Teperek, published on 29 January 2018
- [3 months' Data Stewardship Progress Report at the Faculty of Civil Engineering and Geosciences](#) – by Kees den Heijer, published on 28 November 2017
- [1.5 months' Data Stewardship Progress Report at the Faculty of Aerospace Engineering](#) – by Heather Andrews, published on 28 November 2017
- [4 months' Data Stewardship Progress Report at the Faculty of Electrical Engineering, Mathematics and Computer Science](#) – by Munire van der Kruijk-Dellibay, Robbert Eggermont and Jasper van Dijck, published on 28 November 2017
- [Update on the Data Stewardship project at TU Delft: 3 months' progress report](#) – by Alastair Dunning and Marta Teperek, published on 28 November 2017

Project updates and planning

- [5 Data Steward Positions](#) – by Marta Teperek, published on 29 October 2017

<https://openworking.wordpress.com/data-stewardship/>

Community building



Spreading the word

Open Science Roadshows

- Dedicated presentations at ALL departments at ALL TU Delft faculties
 - 50+ presentations
- Every two years
- Centered around reproducible research practices

Community building: Open Science Seminars



APR
04

Making research reproducible: a call for action

by Research Data Services, TU Delft
Library

Free



Sales Ended

[DETAILS](#)

DESCRIPTION

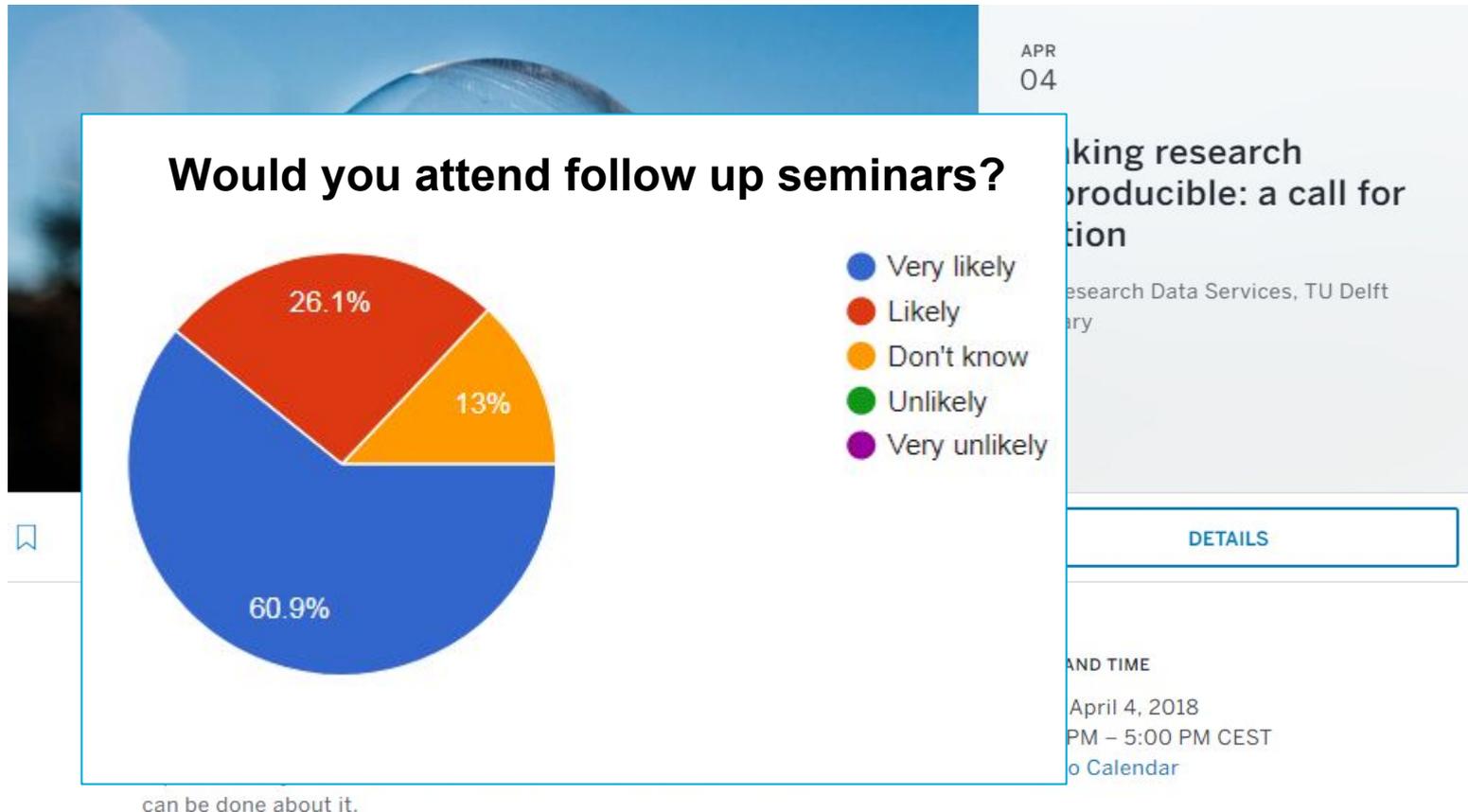
Have you heard about the reproducibility crisis in science? In this afternoon talk, Dr Arnaud Vaganay will explain what is the reproducibility crisis, what are the main reasons for it and what can be done about it.

DATE AND TIME

Wed, April 4, 2018
3:30 PM – 5:00 PM CEST
[Add to Calendar](#)

<https://www.eventbrite.com/e/making-research-reproducible-a-call-for-action-tickets-43552852755#>

Community building: Open Science Seminars



Community building: Data/Code Champions

- Call for Champions started in May 2018
- Local advocates for good data management



Our data/code champions so far

- Activism
- Grassroots change
- Funds for training
- Spreading the word
- Recognition
- bi-monthly meetings
- Annual meet

	<p>Wim Huang Assistant Professor Faculty of Technology, Policy and Management Department: Multi-Actor Systems Areas of expertise: Data analysis, modelling, simulation + Contact information + Motivation</p>		<p>Denis van der Meer Assistant Professor Faculty of Civil Engineering and Geosciences Department: Materials, Mechanics, Management & Design Areas of expertise: Computational mechanics, coding, simulations + Contact information + Motivation</p>
	<p>Annelie Zuidema <small>(PhD, van 20)</small> Postdoc/one Researcher Faculty of Technology, Policy and Management Department: Engineering Systems and Services Areas of expertise: Open data, research data, data infrastructures, design, user service patterns, online education + Contact information + Motivation</p>		<p>Thomas Abbeel Assistant Professor Faculty of Electrical Engineering, Mathematics and Computer Science Department: Intelligent Systems Areas of expertise: Bioinformatics, genomics, high performance computing, data integration + Contact information + Motivation</p>
	<p>Anton Akhmerov Associate Professor Faculty of Applied Sciences Department: Quantum Nanoscience Areas of expertise: Quantum nanoscience, numerical simulations + Contact information + Motivation</p>		<p>Scott Cunningham Associate Professor Faculty of Technology, Policy and Management Department: Multi-Actor Systems Areas of expertise: Statistics, Bayesian networks, image processing, geographic information systems, open source computing, text mining, consumer and microdata, science and technology information, urban science, municipal policy making + Contact information + Motivation</p>
	<p>Victor Koozeban PhD Student Faculty of Applied Science Areas of expertise: Biochemical engineering, Simulation tools for the design and optimisation of equipment in purification processes, Software version control tools (git, easy/build etc), Reproducible workflows using Matlab and Python. + Contact information + Motivation</p>		<p>Stan Jones PostDoc Researcher Faculty of CTG, Geoscience and Engineering Areas of expertise: Electronic Lab Notebooks (ELNs), Experimental study of 2D foam flows, Small scale core floods + Contact information + Motivation</p>
	<p>Calvin Rans Assistant Professor Faculty of Aerospace Engineering Department: Aerospace Structures & Materials Areas of expertise: My academic expertise is on the fatigue and damage tolerance behaviour of aircraft materials and structures. Regarding data management: Open Science Frameworks and use of repositories such as GitHub.</p>		<p>Colin Rand Assistant Professor Faculty of Applied Sciences, Department of Radiat Science and Technology Areas of expertise: Computational physics, coding (Python, Matlab, C), version control (Gitlab, svn, git), patient data management, project management</p>

Policy framework

2016-2017



- Faculty Secretaries
- ICT
- Legal Services
- Strategic Development
- Valorisation Centre

Drafting and consultations

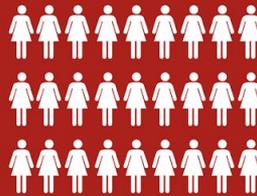
Jan 2018 - Jun 2018



- CvB (27 March)
- Groepsraad (9 April)
- Team of Directors
- CvB (27 June)

Information and strategic consultation

June 2018 onwards



- Led by the Data Steward
- Working Groups at faculties

Faculty-wide consultations and policy development

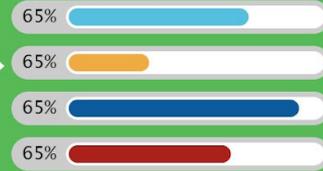
2018/2019



- Policy communication
- Awareness raising
- Led by the Data Steward

Faculty policy publication

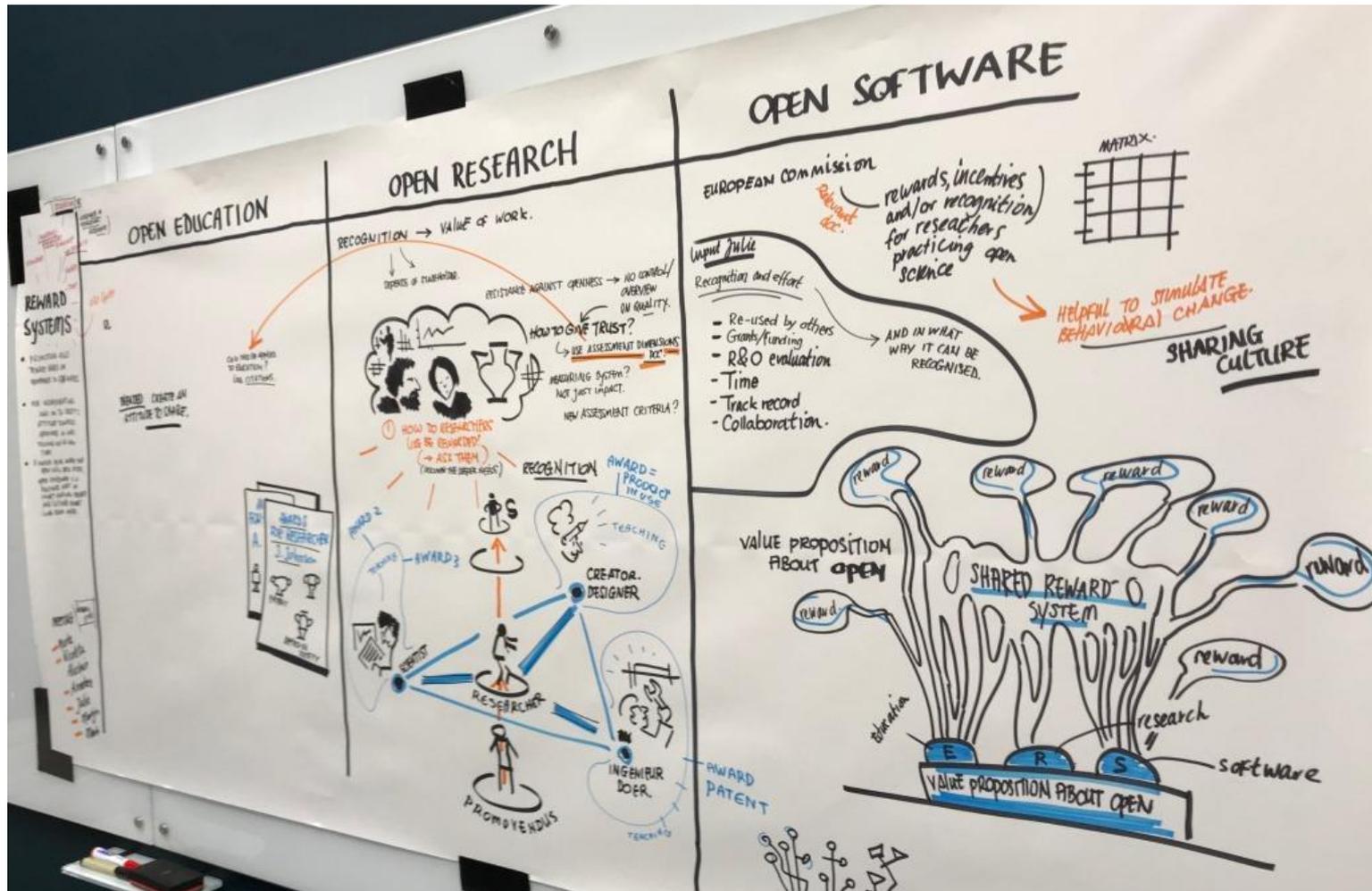
2019+



- Led by the Data Stewards
- Response to community feedback and external factors

Regular revisions and monitoring of behavioural change

Rewarding researchers for quality (reproducible) research



The sketch will be available at:
<https://opensketching.weblog.tudelft.nl/>

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Need for international collaboration



European Open Science Cloud



English

EN

Search

[European Commission](#) > [Research and Innovation](#) > [Strategy](#) > [Policy goals](#) > [Open Science](#) >

European Open Science Cloud (EOSC)

This is a cloud for research data in Europe. Background, policy information, events and publications related to the EOSC

<http://ec.europa.eu/research/openscience/index.cfm?pg=open-science-cloud#>

Recent efforts



SEP
26

Time for open science skills to count in academic careers!

by 4TU.Centre for Research Data in association with EOSCPilot

Free

[REGISTER](#)

Summary

- The case for open science/data, research reproducibility and barriers to overcome
- The TU Delft approach to open science and data management/sharing
- Some international efforts

Questions? Feedback? Suggestions?

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[@shalini_kr](https://www.instagram.com/shalini_kr)