An open science dashboard for biomedical institutions

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Background

Open Science

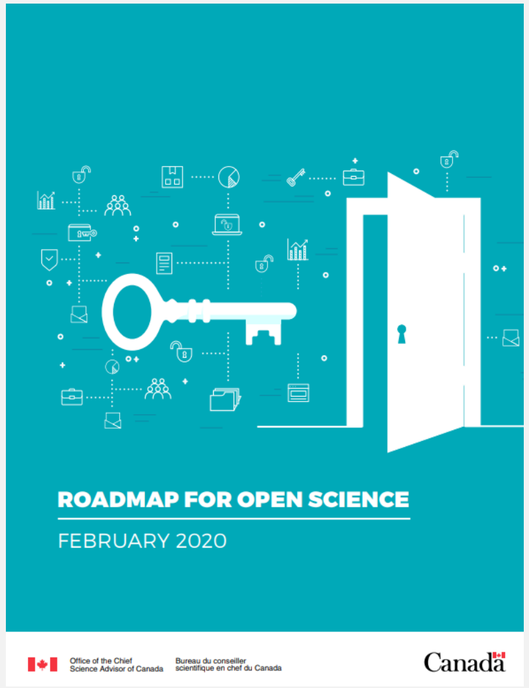
A movement and practice to conduct science in a more transparent way

No consensus on what open science entails

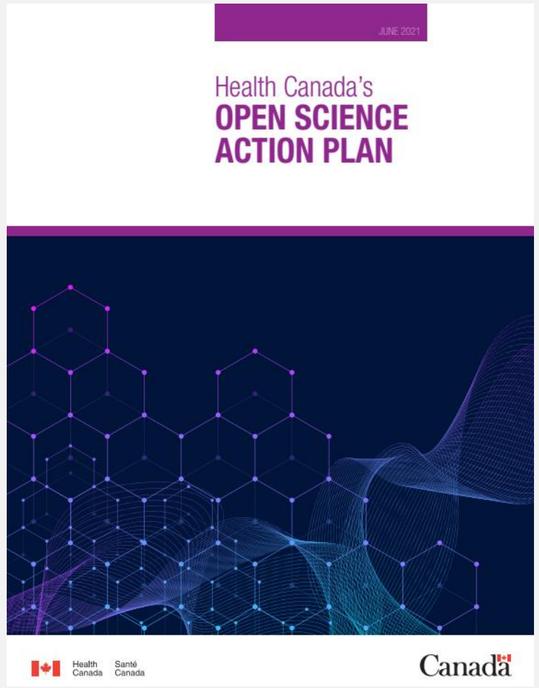
- Open access
- Open data
- Open materials
- Preprints
- Reporting guidelines
- Study registration
- Open peer review
- Open education

Open science is a policy priority globally

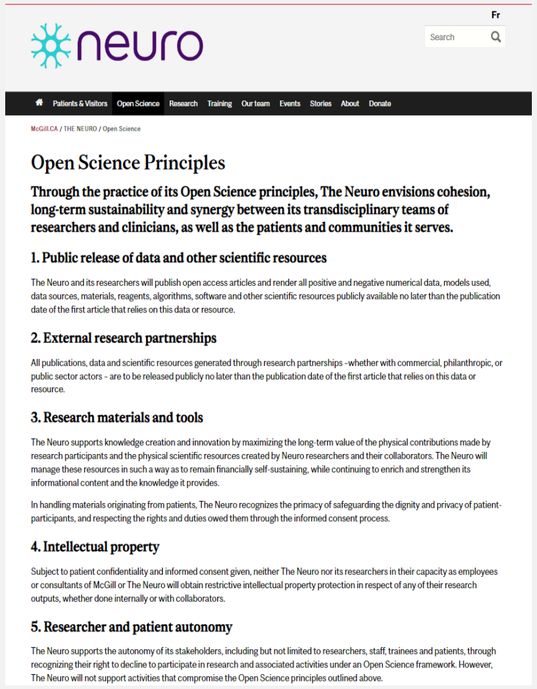
[UNESCO Recommendation on Open Science - UNESCO Digital Library]



[Roadmap for Open Science]



[Health Canada's Open Science Action Plan - Canada.ca]



[Open Science Principles | The Neuro - McGill University]

The problem with policy…

“What gets measured, gets done”

> Consider clinical trial registration and results reporting in Canada

Why does it matter?

> A registration establishes precedence for a study
> Registries are publicly accessible and searchable
> Allow us to determine if there is reporting bias

The problem with policy…(cont.)

An audit of Canadian clinical trials

> Examined all registered clinical trials on ClinicalTrials.gov conducted in Canada between 2009 and 2019

> A cross-sectional analysis of those trials assessed prospective registration, subsequent result reporting in the registry, and subsequent publication of study findings.

> A total of 6,720 trials met the inclusion criteria

OPEN ACCESS | Article

Evaluating prospective study registration and result reporting of trials conducted in Canada from 2009 to 2019

Authors: Mohsen Alayche, Kelly D. Cobey, Jeremy Y. Ng, Clare L. Ardern, Karim M. Khan, An-Wen Chan, Ryan Chow, Mouayad Masalkhi, Ana Patricia Ayala, Sanam Ebrahimzadeh, Jason Ghossein, Ibrahim Alayche, Jessie V. Willis, and David Moher SHOW FEWER

AUTHORS INFO & AFFILIATIONS

Publication: FACETS • 23 November 2023 • https://doi.org/10.1139/facets-2022-0208

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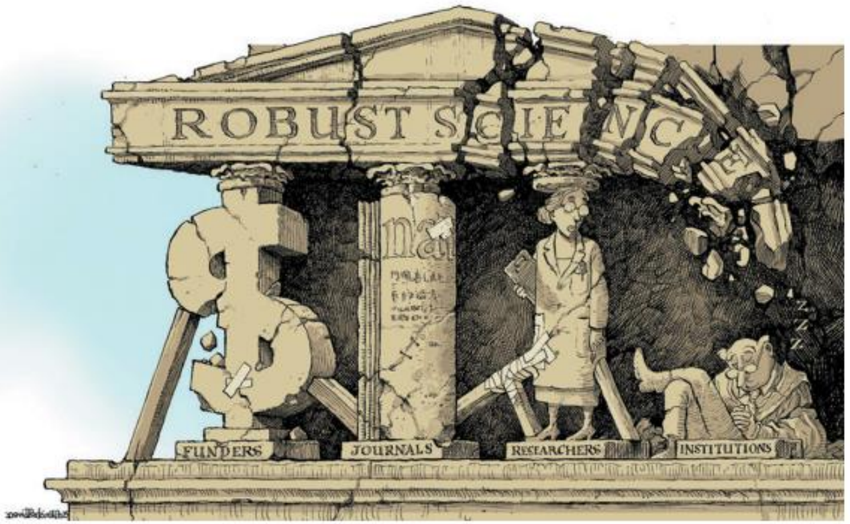
	%
1. What percent of clinical trials are registered before the study starts?	56%
2. What percent of clinical trials report the results in the registry when done?	39%
3. What percent of clinical trials go on to be published in a scholarly journal?	55%
4. What percent of clinical trials do all three practices?	3%

Vision

To create an automated open science dashboard to track practices at the institutional level

Use an integrated-knowledge translation approach to get researchers and research institutions perspectives from the outset of the program



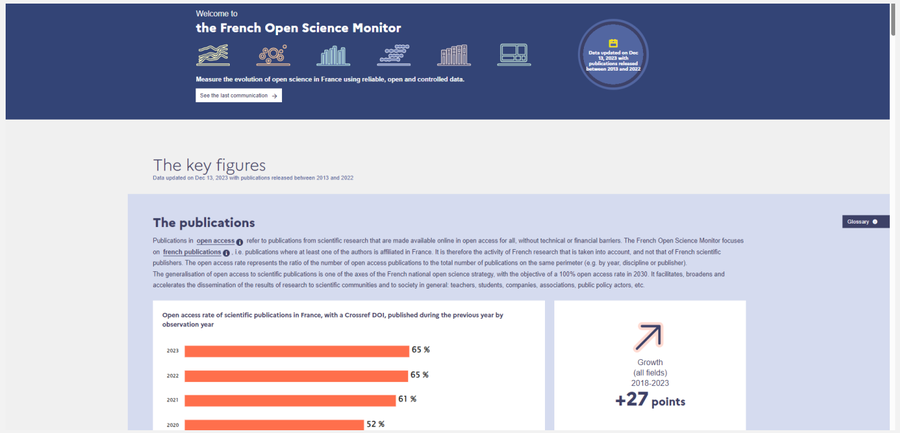
Institutions must do their part for reproducibility

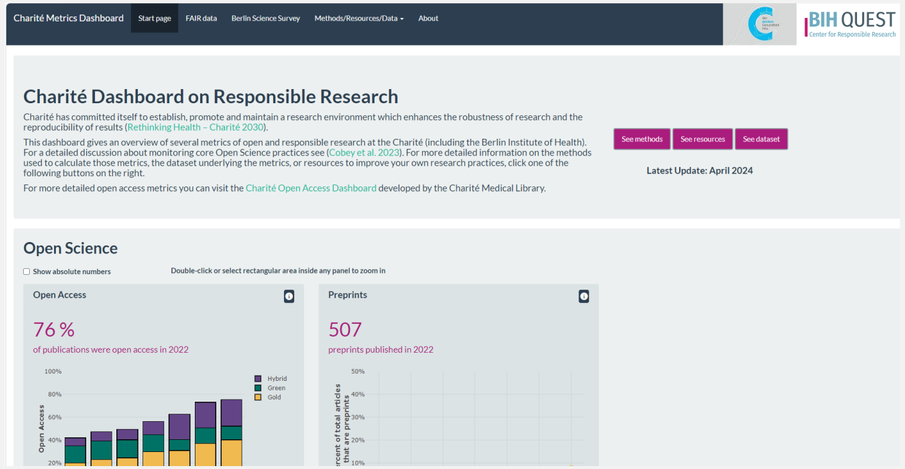
Tie funding to verified good institutional practice, and robust science will shoot up the agenda, say **C. Glenn Begley**, **Alastair M. Buchan** and **Ulrich Dirnagl**.

[Robust research: Institutions must do their part for reproducibility | Nature]

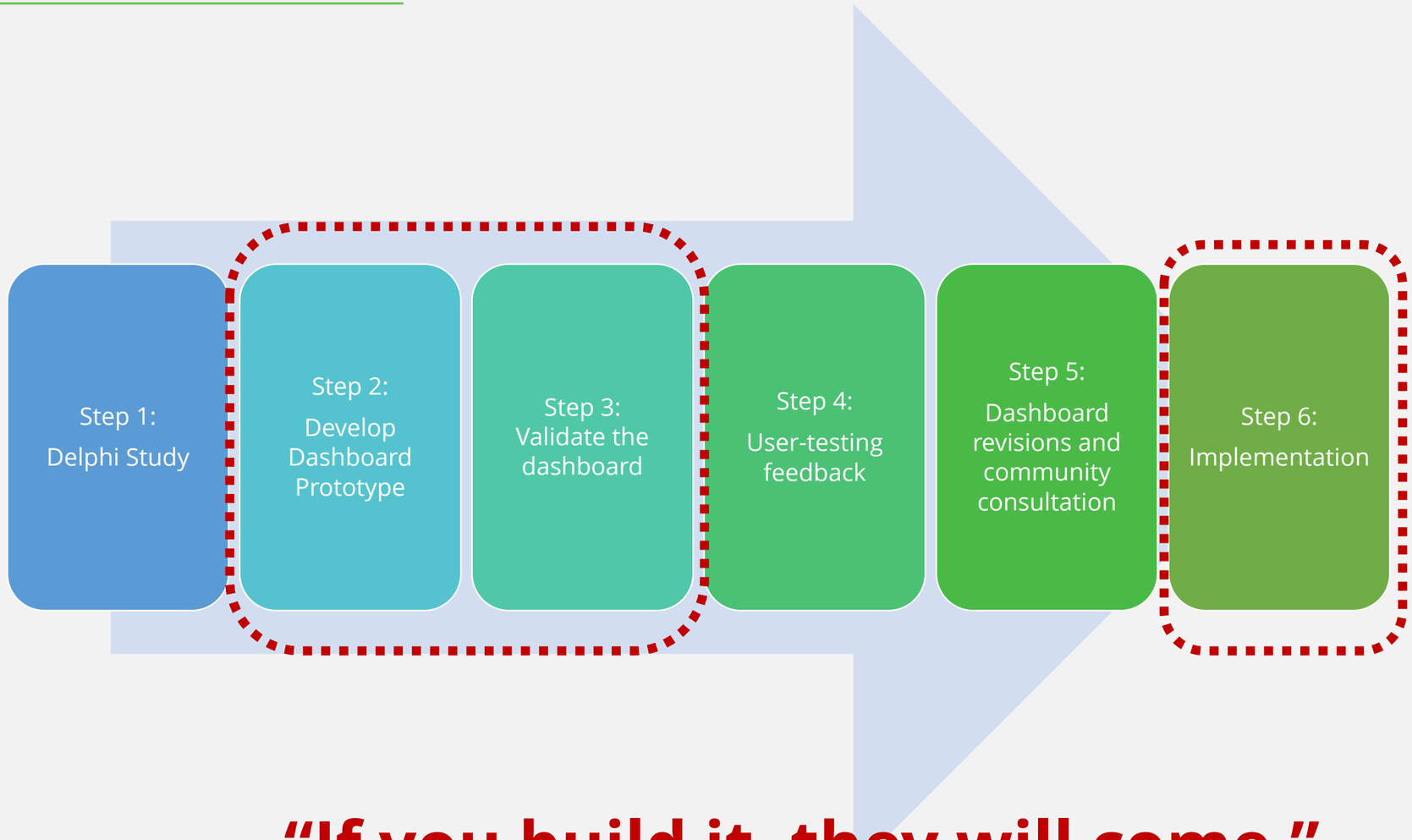
Monitoring open science has started

There is existing precedence for open science dashboards





Program



“If you build it, they will come.”

Step 1: Delphi

> 3 round Delphi
> 80 participants, 20 institutions

> **What practices should we track in an institutional biomedical open science dashboard?**

CONSENSUS VIEW

Community consensus on core open science practices to monitor in biomedicine

Kelly D. Cobey[1,2*], Stefanie Haustein[3,4], Jamie Brehaut[2,5], Ulrich Dirnagl[6,7], Delwen L. Franzen[7], Lars G. Hemkens[7,8,9], Justin Presseau[2,5,10], Nico Riedel[6], Daniel Strech[6,11], Juan Pablo Alperin[4,12], Rodrigo Costas[13], Emily S. Sena[14], Thed van Leeuwen[13], Clare L. Ardern[15,16], Isabel O. L. Bacellar[17], Nancy Camack[5], Marcos Britto Correa[18], Roberto Buccione[19], Maximiliano Sergio Cenci[18], Dean A. Fergusson[2,5], Cassandra Gould van Praag[20], Michael M. Hoffman[21,22,23,24], Renata Moraes Bielemann[25], Ugo Moschini[26], Mauro Paschetta[27], Valentina Pasquale[26], Valeria E. Rac[28,29,30], Dylan Roskams-Edris[31,32], Hermann M. Schatzl[33], Jo Anne Stratton[31], David Moher[2,5]

Table 3. Prioritization of traditional open science practices and broader transparency practices.

No.	Practice	Score
	Traditional open science practices	
1	Reporting whether clinical trials were registered before they started recruitment	9.71
2	Reporting whether study data were shared openly at the time of publication (with limited exceptions)	9.18
3	Reporting what proportion of articles are published open access with a breakdown of time delay	8.12
4	Reporting whether study code was shared openly at the time of publication (with limited exceptions)	7.94
5	Reporting whether systematic reviews have been registered before data collection began	6.76
6	Reporting whether clinical trials results appeared in the registry from 1 year after study completion	6.76
7	Reporting whether there was a statement about study materials sharing with publications	6
8	Reporting whether a reporting guideline checklist was used	5.88
9	Reporting citations to data	5.53
10	Reporting trial results in a manuscript-style publication (peer reviewed or preprint)	4.82
11	Reporting the number of preprints	4.35
12	Reporting systematic review results in a manuscript-style publication (peer reviewed or preprint)	2.94
	Broader transparency practices	
1	Reporting whether author contributions were described	5.12
2	Reporting whether author conflicts of interest were described	4.71
3	Reporting the use of persistent identifiers when sharing data/code/materials	4.65
4	Reporting whether ORCID identifiers were used	4.47
5	Reporting whether data/code/materials are shared with a clear license	3.47
6	Reporting whether research articles include funding statements	3
7	Reporting whether the data/code/materials license is open or not	2.59

https://doi.org/10.1371/journal.pbio.3001949.t003

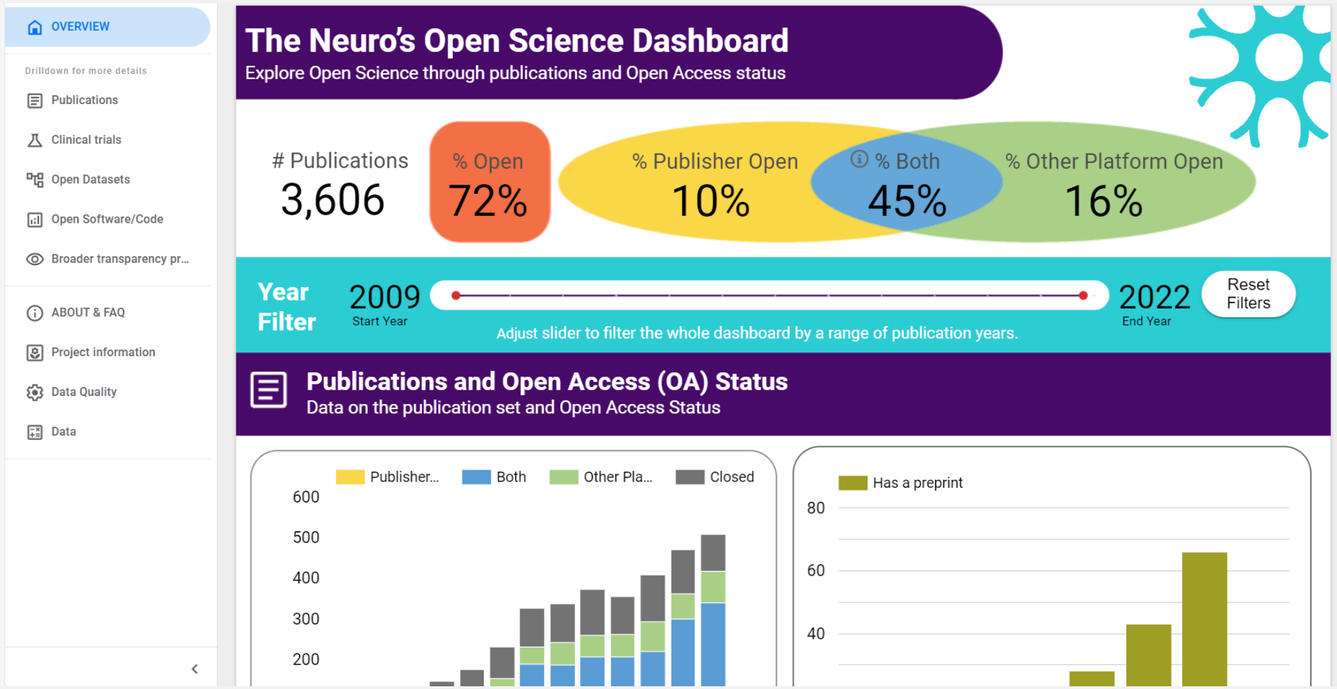
Step 2: Develop the dashboard prototype

> Relies on institutions to identify their publication output and trial identifiers

> Developed using predominantly open-source process pipelines and text-mining algorithms for fetching, processing, and analysing data about academic institutions

> 9 /19 desired open science practices automated

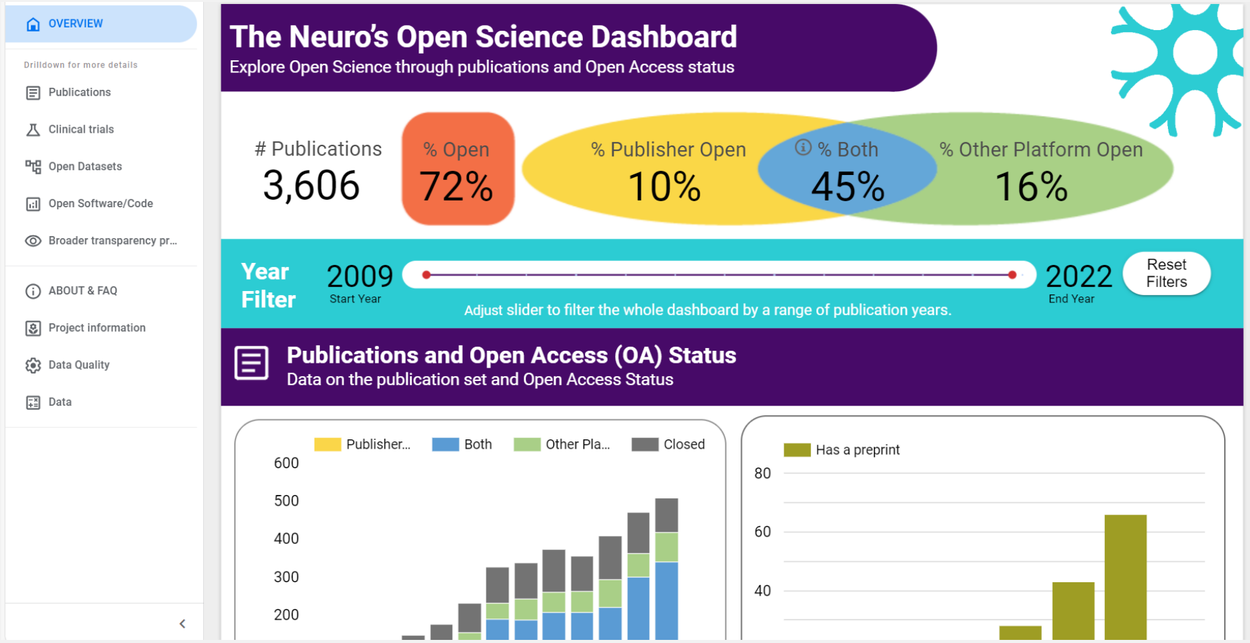
> Uses a subset of the larger Academic Observatory dataset from the Curtin Open Knowledge Initiative (COKI). The COKI Academic Observatory data collection pipeline fetches data about publications from multiple sources, synthesizes the datasets into a Google Cloud Platform database, and determines the Open Access status.



Step 2: Develop the dashboard prototype

> The dashboard also utilizes Open Data Detection in Publications (ODDPub), a text-mining algorithm tailored towards biomedical literature.

> A customized open-source code is also used to extract data from ClinicalTrials.gov via the Aggregate Analysis of ClinicalTrials.gov (AACT) Database



https://osd_usertesting.openknowledge.community/

Step 3: Validate the dashboard

> 15% sample of Neuro publications (N=540) published between 2009 and 2022

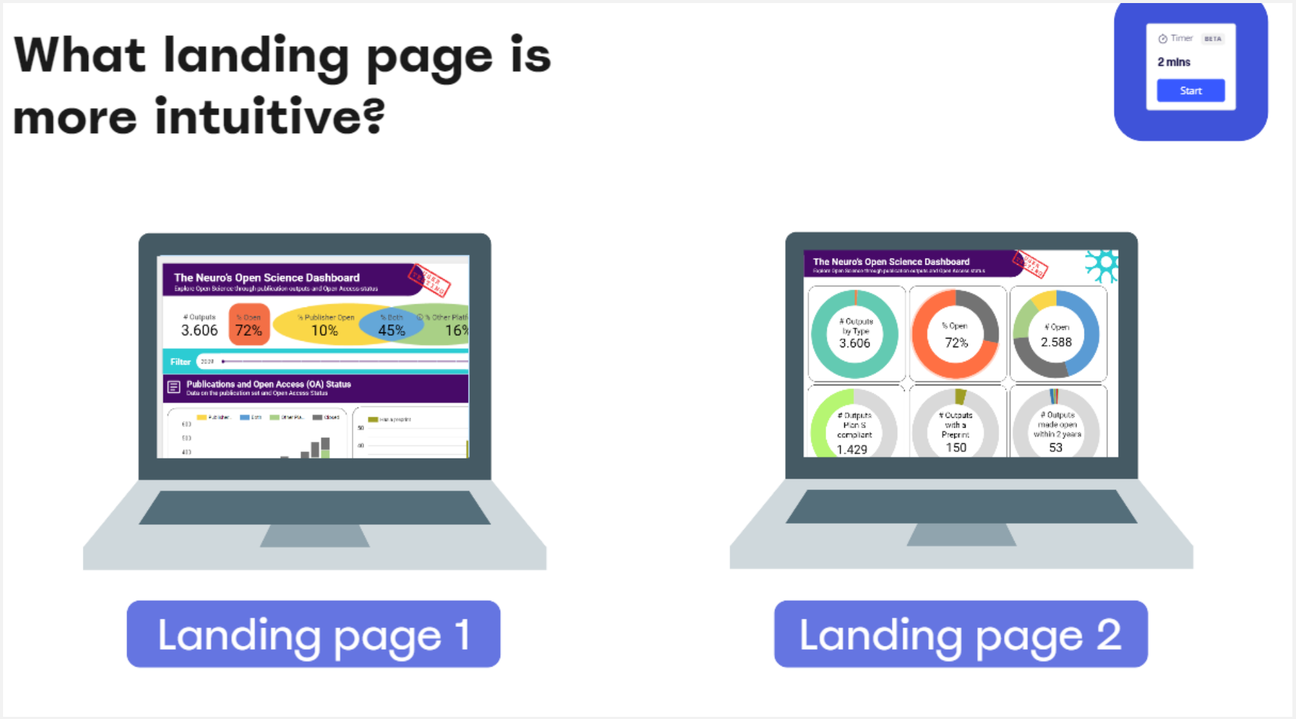
> Manual validation in duplicate

> 85% cutoff for inclusion in the dashboard

Practice	Description	Operationalization
Open access	Reporting the proportion of articles which are published open access with a breakdown of time delay	Determines the degree of openness of the publications, for Publisher Open, other Platform Open and Closed Access, by researchers affiliated with the institution, based on Unpaywall. The breakdown is available by year.
Open data	Reporting whether study data was shared openly at the time of publication	Measure how many publications share their research data with the publication, using the text-mining algorithm ODDPub.
Open code	Reporting whether study code was shared openly at the time of publication	Measure how many publications share their analysis code with the publication, using the text-mining algorithm ODDPub.
Trial Registration	Reporting whether clinical trials were registered before they started recruitment	Measures if the clinical trials are registered before the start date of the study, according to the information given on ClinicalTrials.gov.
Trial results reporting in registry	Reporting whether clinical trials results appeared in the registry from 1 year after study completion	Measures how many of the clinical trials registered in ClinicalTrials.gov which are due to report their results have already done so.
Trial results reporting in publication	Reporting trial results in a manuscript-style publication (peer reviewed or preprint)	Measures how many clinical trials registered on ClinicalTrials.gov reported their results as a journal publication.
Preprints	Reporting the number of preprints	Measures how many formal publications also have a version of the manuscript available on a preprint server, using Unpaywall metadata.
Use of ORCID	Reporting whether ORCID identifiers were used	Checks for the publication DOI present in any ORCID record.
Funder statements	Reporting whether research articles include funding statements	Measures how many publications include a funding statement, based on metadata from Crossref.

Step 4: User-testing feedback

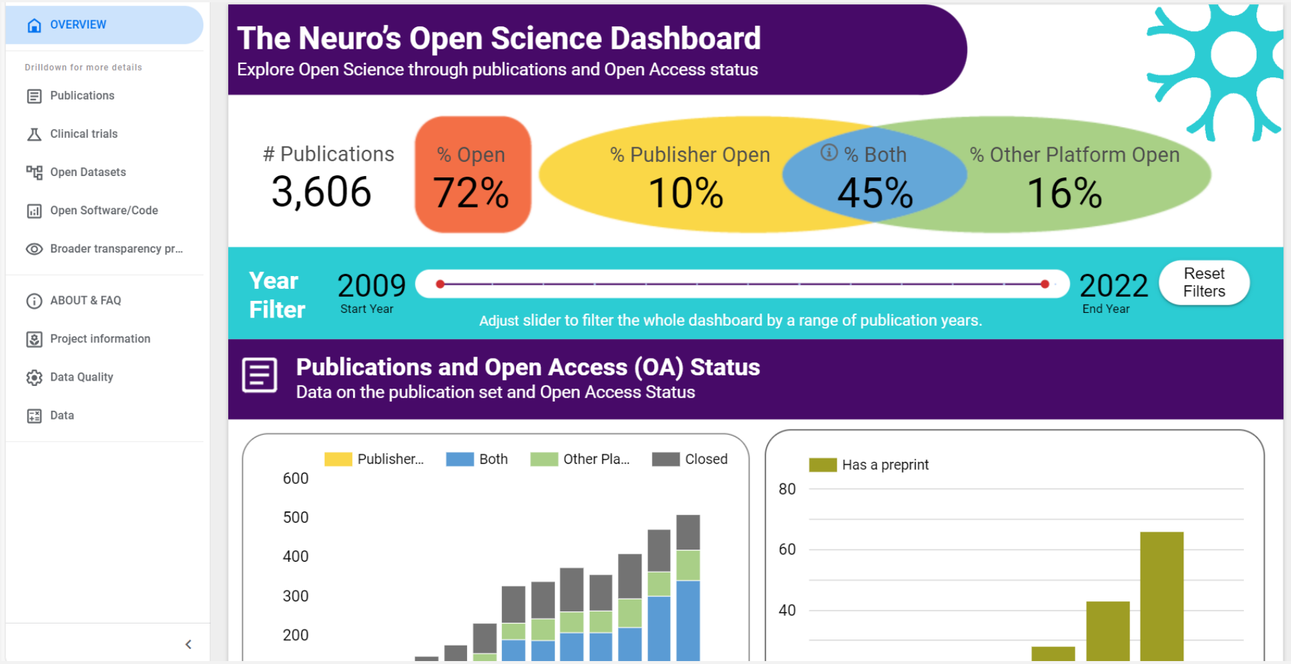
- 25 members from the Delphi re-engaged for a user testing session
- Completed an A/B test to select the most appropriate dashboard landing page
- Answer a series of questions about:
  - the ease of using the dashboard
  - the quality of data visualizations
  - overall feedback to improve the dashboard



Step 5: Dashboard revisions and community consultation

- Re-engaged 10 institutions represented in the Delphi for focus groups
  - 6 universities, 2 research hospitals, and 2 research centres from 6 countries
- 1-hour sessions; 1-5 staff members in each group
- Vision to create an implementation handbook

How can we make this dashboard relevant in your context?



Step 6: Implementation

- Five partners in Canada committing to implementing the dashboard through a consortium; 3-year commitment
- Evaluating the dashboard within and between institutions - the benefit of a core outcome set of agreed variables
- Targeting (educational) interventions to drive improvements

Acknowledgements

Project team

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