The BIDS Starter Kit

Applying, understanding, and contributing to the Brain Imaging Data Structure

Kirstie Whitaker

MRC CBU Methods Day

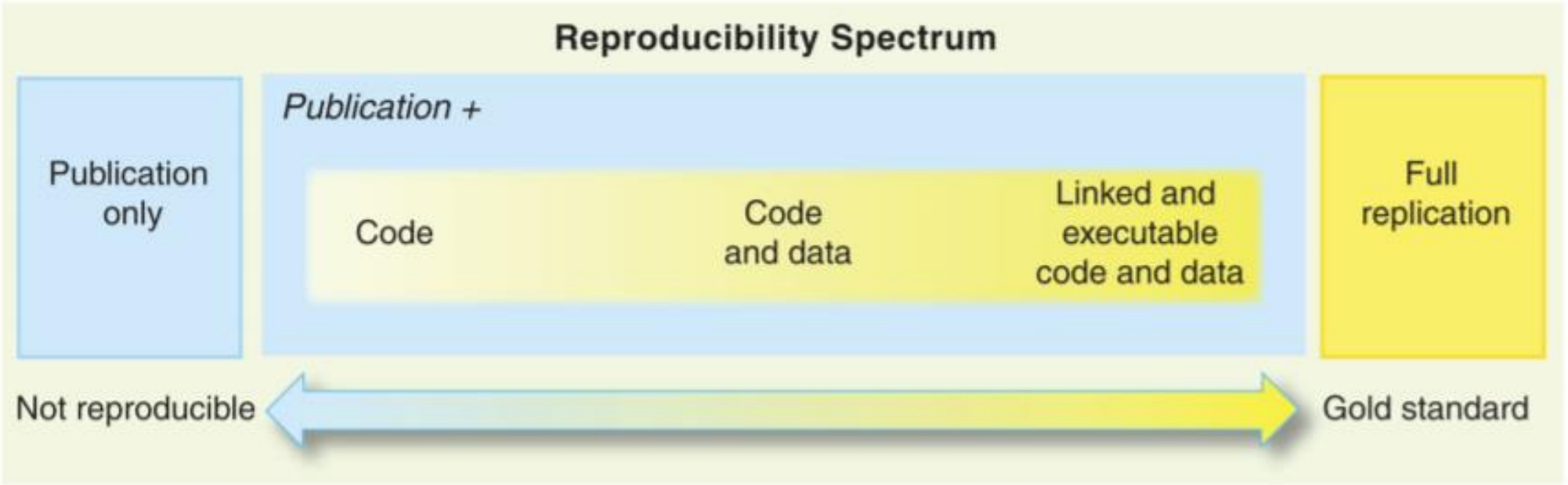
4 December 2018

DOI: 10.6084/m9.figshare.7415765

- Research fellow at the Alan Turing Institute – the UK's national institute for Data Science and Artificial Intelligence.

- Senior research associate in the Department of Psychiatry at the University of Cambridge.

- Passionate about making it easy for people to share evidence of the work they did
  - Published papers without data or code are just nice stories!



Peng, R. D. *Science* doi: 10.1126/science.1213847 (2011).

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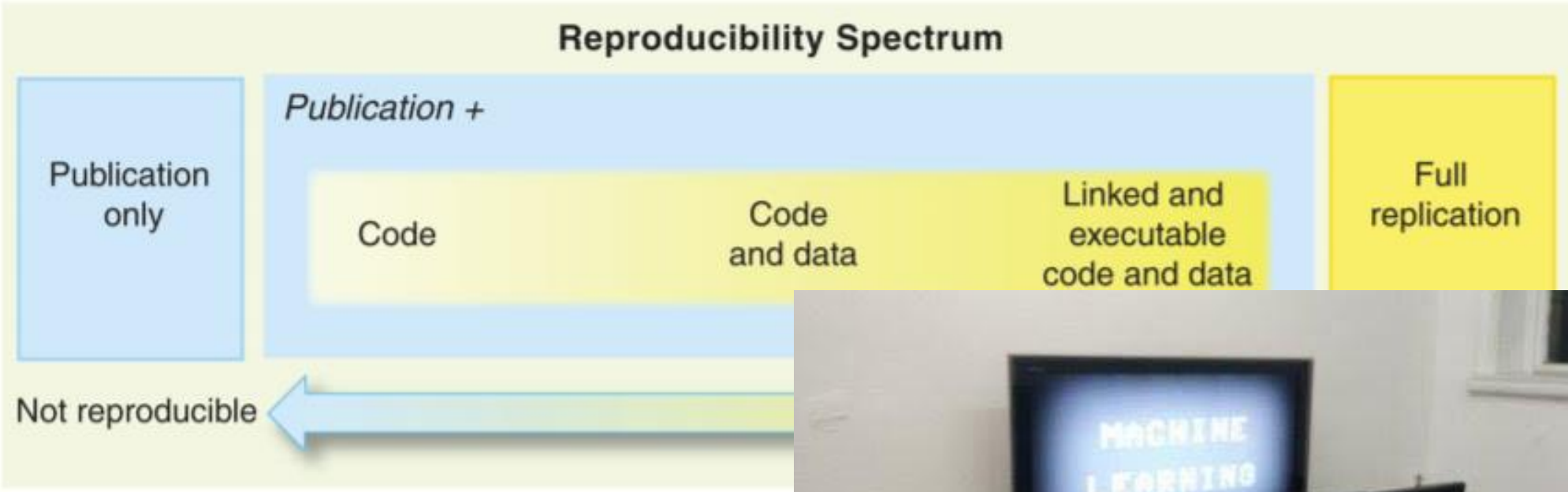
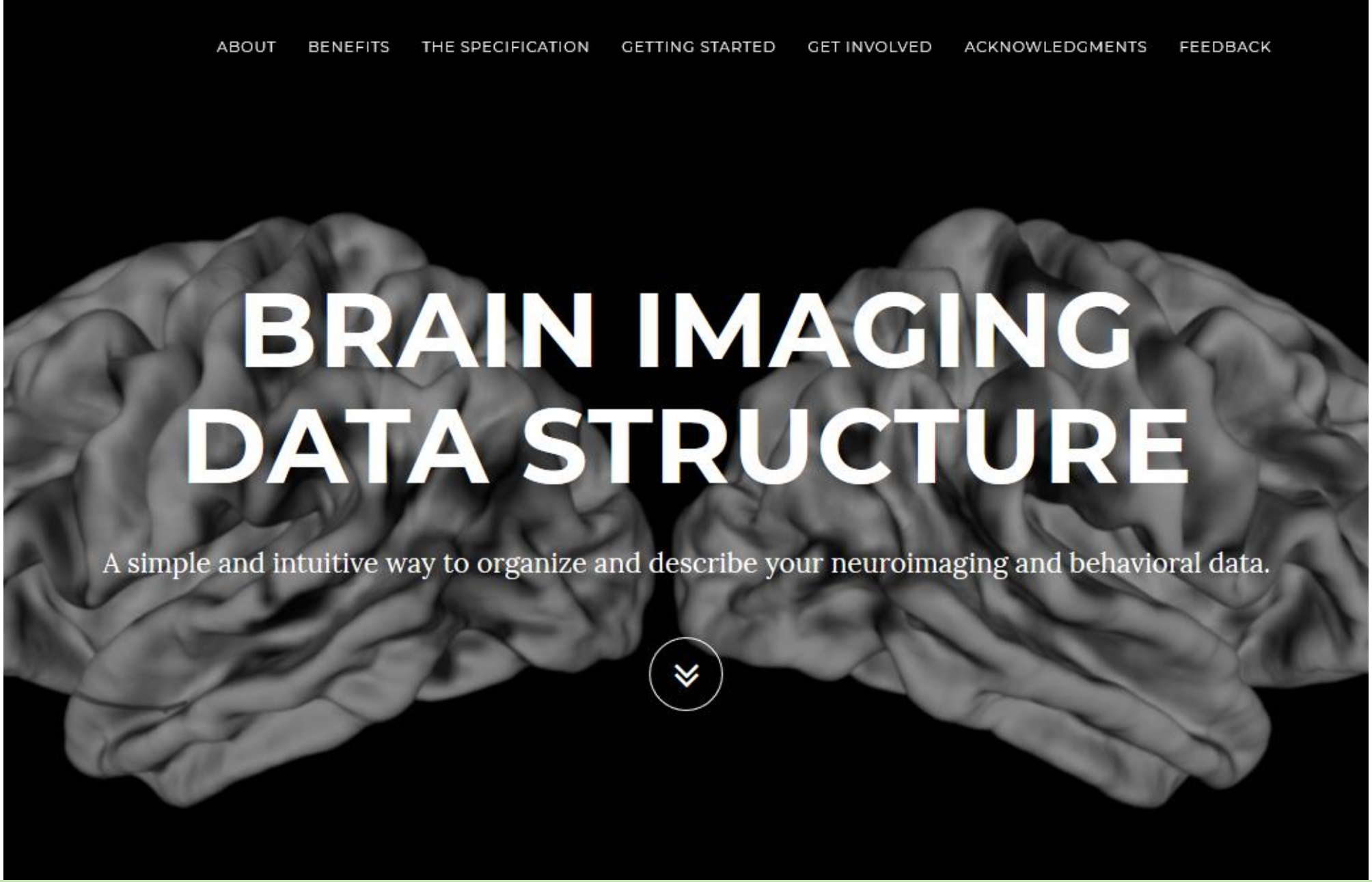
Image credit: https://gifer.com/en/8FBz



Peng, R. D. *Science* doi: 10.1126/science.1213847 (2011).

Image credit: https://www.reddit.com/r/ProgrammerHumor/comments/7e9yj1/machine_learning

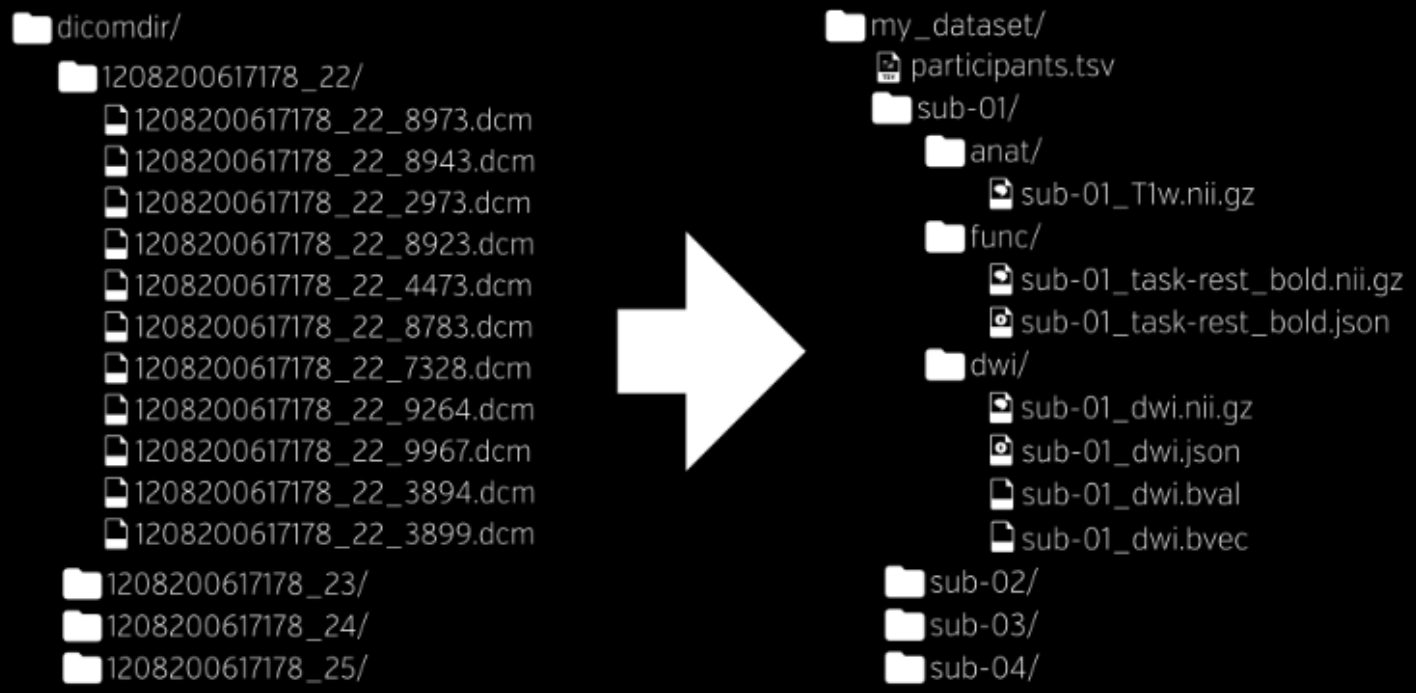


http://bids.neuroimaging.io

ABOUT | BENEFITS | THE SPECIFICATION | GETTING STARTED | GET INVOLVED | ACKNOWLEDGMENTS | FEEDBACK

ABOUT BIDS

Neuroimaging experiments result in complicated data that can be arranged in many different ways. So far there is no consensus how to organize and share data obtained in neuroimaging experiments. Even two researchers working in the same lab can opt to arrange their data in a different way. Lack of consensus (or a standard) leads to misunderstandings and time wasted on rearranging data or rewriting scripts expecting certain structure. Here we describe a simple and easy to adopt way of organizing neuroimaging and behavioral data.



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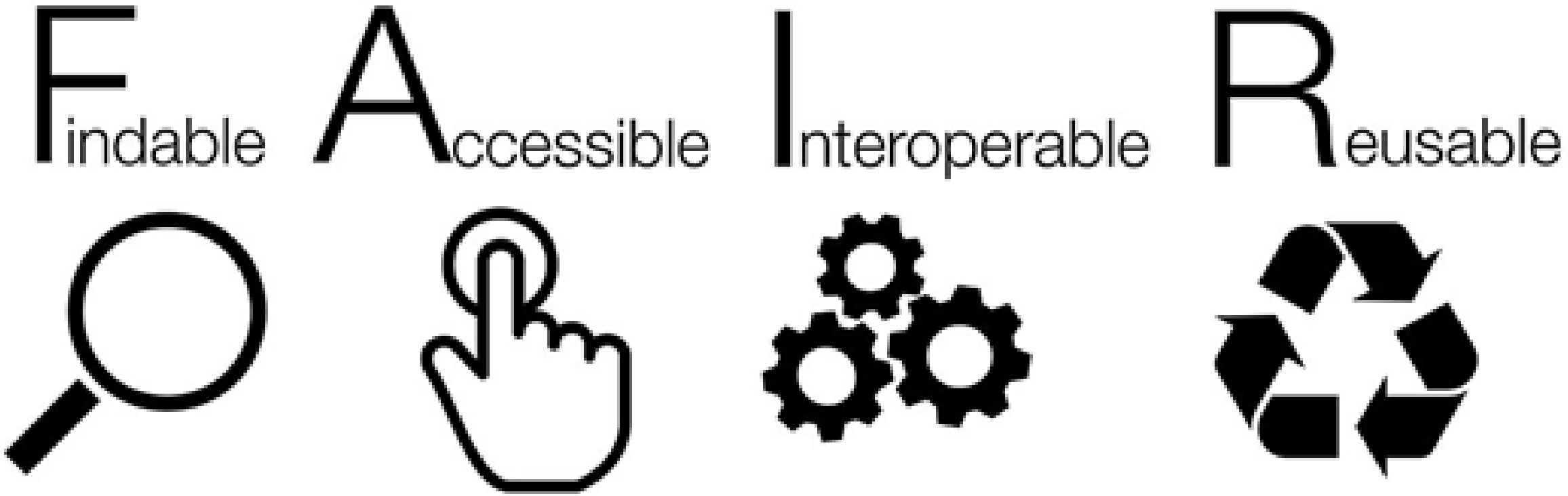

Wilkinson, M. D. *et al. Sci. Data* doi: 10.1038/sdata.2016.18 (2016).

Image credit: Sangya Pundir

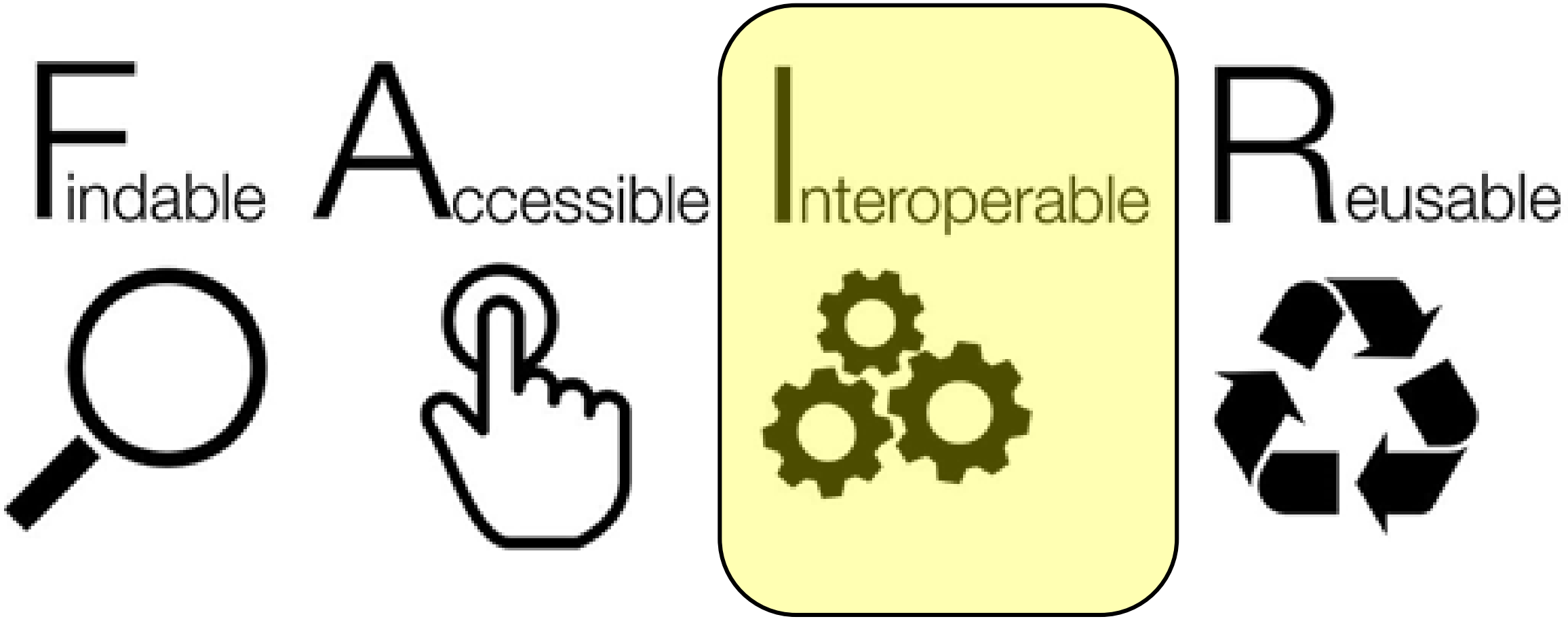

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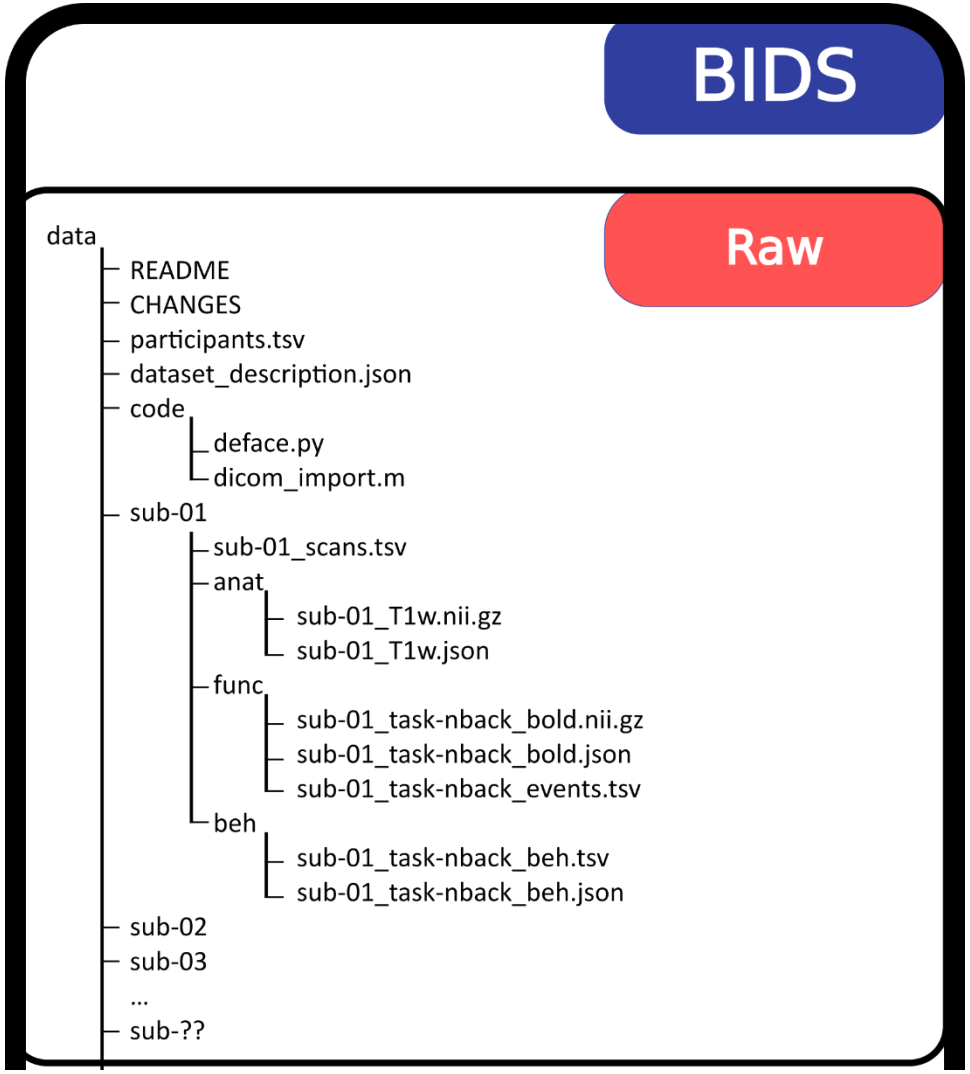
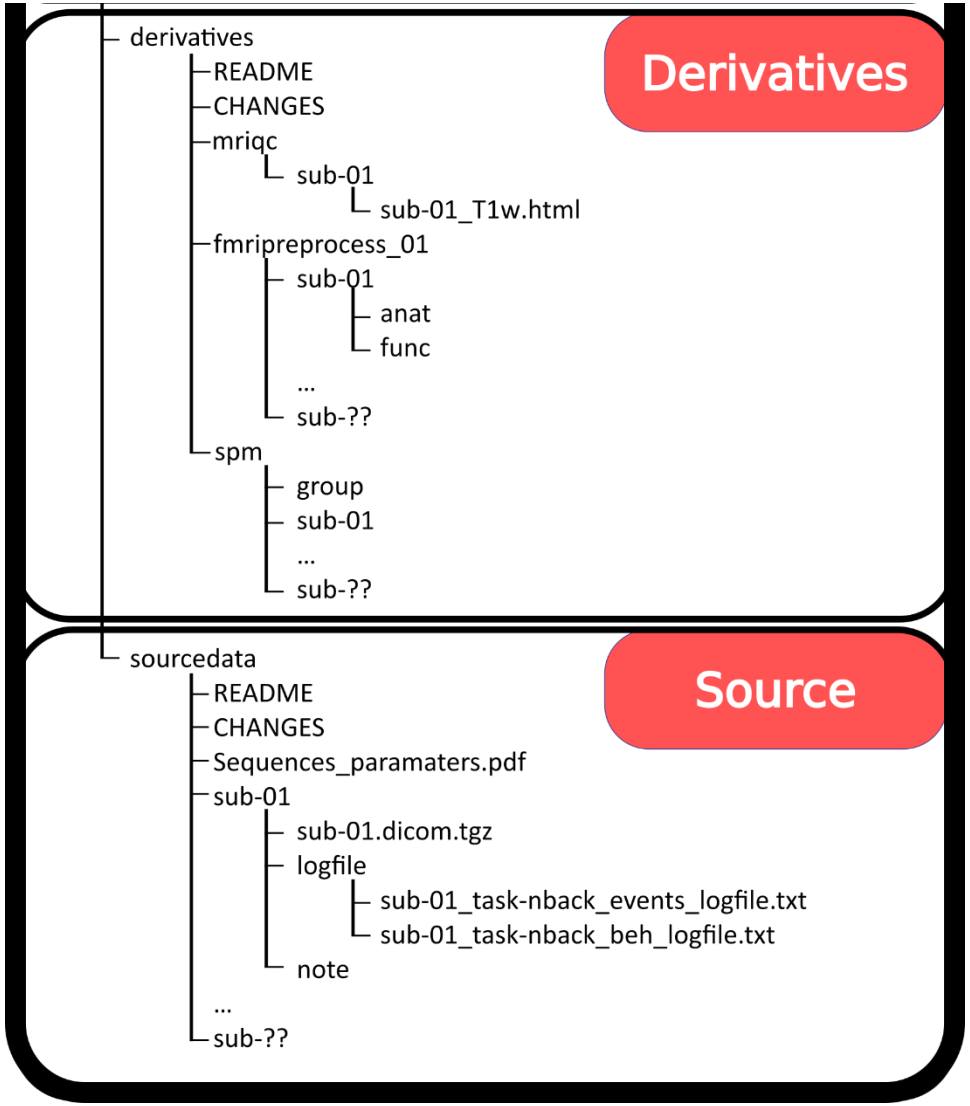
Image credit: Sangya Pundir





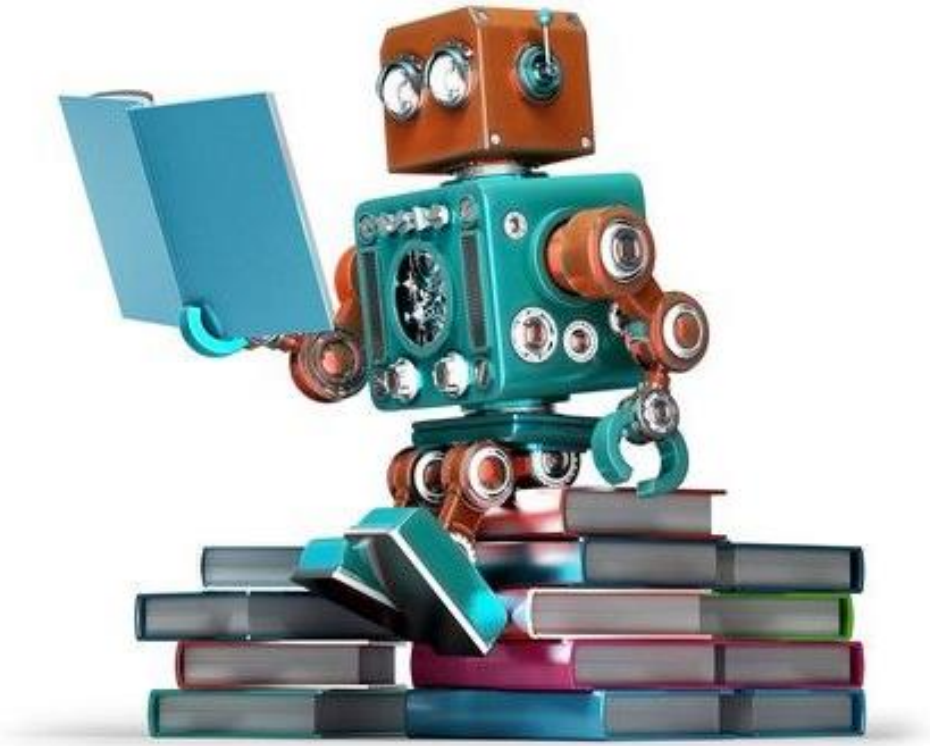
https://github.com/bids-standard/bids-starter-kit/issues/105

Image credit: Remi Gau

```
{
  "Name": "The mother of all experiments",
  "BIDSVersion": "1.0.1",
  "License": "CC0",
  "Authors": [
    "Paul Broca",
    "Carl Wernicke"
  ],
  "Acknowledgements": "Special thanks to Korbinian Brodmann for help in
  formatting this dataset in BIDS. We thank Alan Lloyd Hodgkin and Andrew
  Huxley for helpful comments and discussions about the experiment and
  manuscript; Hermann Ludwig Helmholtz for administrative support; and
  Claudius Galenus for providing data for the medial-to-lateral index
  analysis.",
  "HowToAcknowledge": "Please cite this paper:
  https://www.ncbi.nlm.nih.gov/pubmed/001012092119281",
  "Funding": [
    "National Institute of Neuroscience Grant F378236MFH1",
    "National Institute of Neuroscience Grant 5RMZ0023106"
  ],
  "ReferencesAndLinks": [
    "https://www.ncbi.nlm.nih.gov/pubmed/001012092119281",
    "Alzheimer A., & Kraepelin, E. (2015). Neural correlates of presenile
    dementia in humans. Journal of Neuroscientific Data, 2, 234001.
    http://doi.org/1920.8/jndata.2015.7"
  ],
  "DatasetDOI": "10.0.2.3/dfjj.10"
}
```

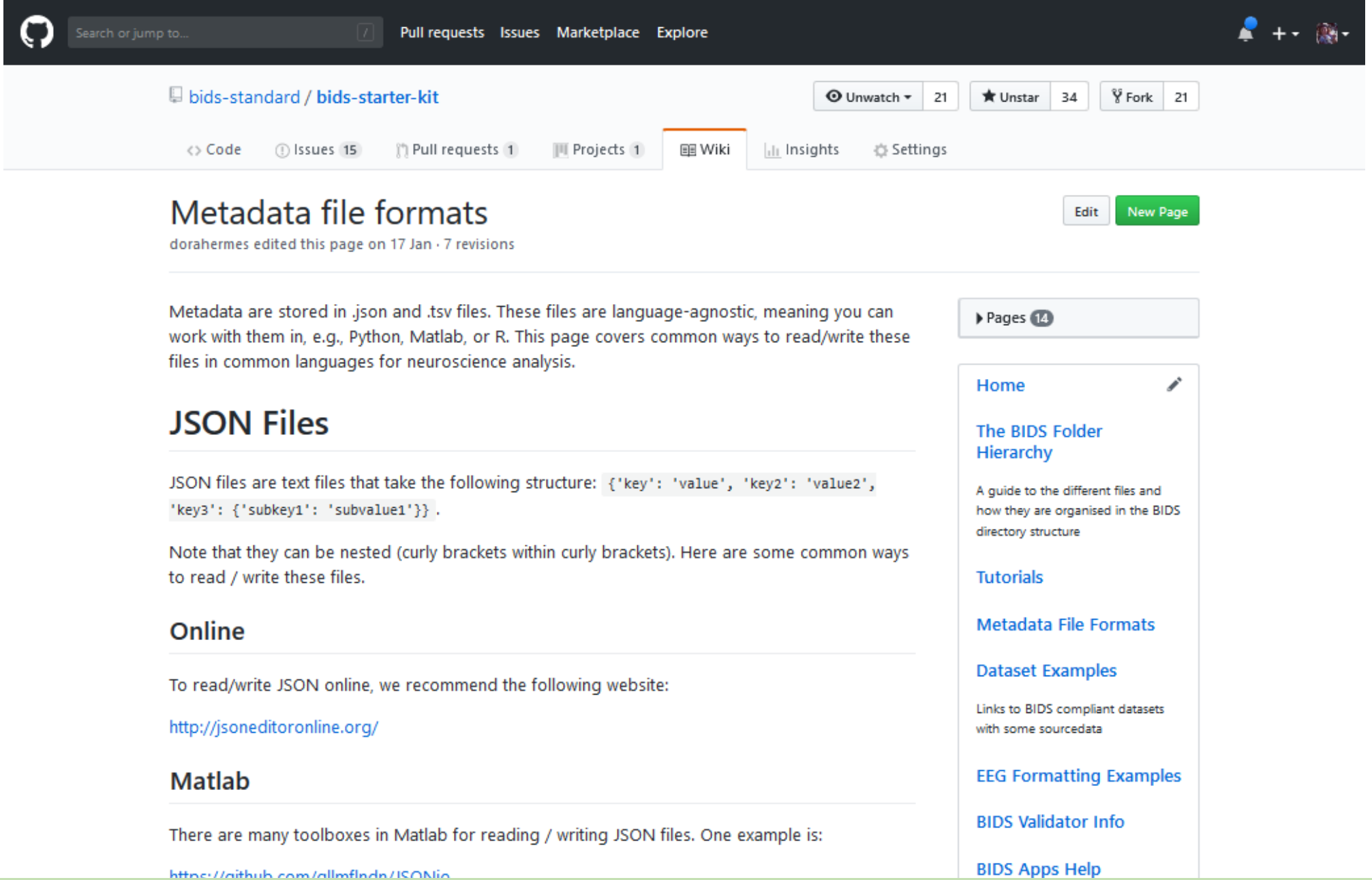
dataset_description.json

The file dataset_description.json is a JSON file describing the dataset. Every dataset MUST include this file with the following fields:



https://bids-specification.readthedocs.io/en/latest/03-modality-agnostic-files.html

Image source: Getty Images



https://github.com/bids-standard/bids-starter-kit/wiki/Metadata-file-formats

Matlab

There are many toolboxes in Matlab for reading / writing JSON files. One example is:

https://github.com/gllmflndn/JSONio

Reading a `.json` file

```
jsonread([filename])
```

Writing a `.json` file

```
root_dir = './';
project = 'temp';
sub_id = '01';
ses_id = '01';
acquisition = 'anat';

anat_json_name = fullfile(root_dir,project,...
    ['sub-' sub_id],...
    ['ses-' ses_id],...
    acquisition,...
    ['sub-' sub_id '_ses-' ses_id '_T1W.json']);

% Assign the fields in the Matlab structure that can be saved as a json:
anat_json.Manufacturer = 'GE';
anat_json.ManufacturersModelName =  'Discovery MR750';
anat_json.MagneticFieldStrength = 3;
anat_json.PulseSequence = 'T1 weighted SPGR';

json_options.indent = '    '; % this makes the json look pretier when opened in a txt edi
jsonwrite(loc_json_name,anat_json,json_options)
```

Python

EEG Formatting Examples

BIDS Validator Info

BIDS Apps Help

Helpful links and a FAQ about BIDS Apps

BIDS Extensions

Glossary

Publications

Community Resources

A collection of resources from the community including slideshows / presentations / graphics / etc.

Useful Links

A collection of links to useful code / other repositories relevant to BIDS

Contact

Clone this wiki locally

https://github.com/bids-stan

https://github.com/bids-standard/bids-starter-kit/wiki/Metadata-file-formats

Python

In Python, JSON support is built into the core library, meaning you don't need to install anything to read/write JSON files. In addition, the structure of JSON is almost identical to that of Python dictionaries (assuming you are only storing text / numbers in the dictionary). To that extent.

Reading a `.json` file

```
import json
with open('myfile.json', 'r') as ff:
    data = json.load(ff)
```

Writing a `.json` file

```
import json
data = {'field1': 'value1', 'field2': 3, 'field3': 'field3'}
with open('my_output_file.json', 'w') as ff:
    json.dump(data, ff)
```

R

There are several packages for reading and writing JSON files from R. In this example, we will be using jsonlite. Remember to install and call a package before using it.

https://github.com/jeroen/jsonlite

Installing required package

```
    install.packages('jsonlite')
```

Reading a `.json` file:

https://github.com/bids-standard/bids-starter-kit/wiki/Metadata-file-formats

TSV files

A Tab-Separate Values (TSV) file is a text file where tab characters (`\t`) separate fields that are in the file. It is structured as a table, with each column representing a field of interest, and each row representing a single datapoint.

Below are ways to read / write TSV files in common languages.

Matlab

Reading a `.tsv` file:

```
readtable([filename],'FileType','text','Delimiter','\t','TreatAsEmpty',{'N/A','n/a'});
```

Writing a `.tsv` file:

```
root_dir = 'MyRootDir';
bidsProject = 'temp';
bids_particpants_name = ['participants.tsv'];

participant_id = ['sub-01'; 'sub-02']; % onsets in seconds
age = [20 30]';
sex = ['m';'f'];

t = table(participant_id,age,sex);
writetable(t,fullfile(root_dir,bidsProject,bids_particpants_name),'FileType','text','Delimite
```

Python

In Python, the easiest way to work with TSV files is to use the Pandas library. This provides a high-level structure to organize, manipulate, clean, and visualize tabular data. You can install `pandas`

https://github.com/bids-standard/bids-starter-kit/wiki/Metadata-file-formats

README.md

Welcome to the BIDS Starter Kit

How to get started with the Brain Imaging Data Structure

A community-curated collection of tutorials, wikis, and templates to get you started with creating BIDS compliant datasets.

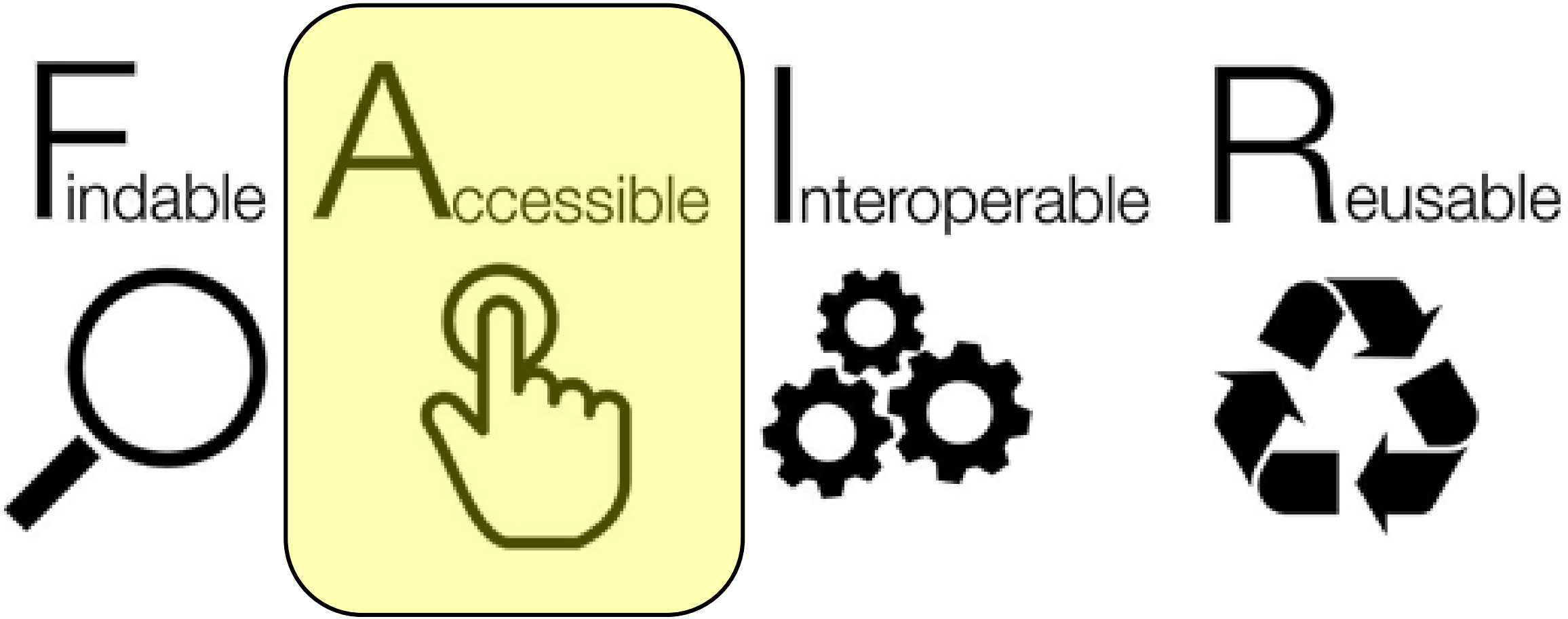
BIDS Homepage | Wiki | Standard | Tutorials | Chat | Forum

Click to view the intro video!

Table of Contents

- Project Summary
- Philosophy

https://github.com/bids-standard/bids-starter-kit



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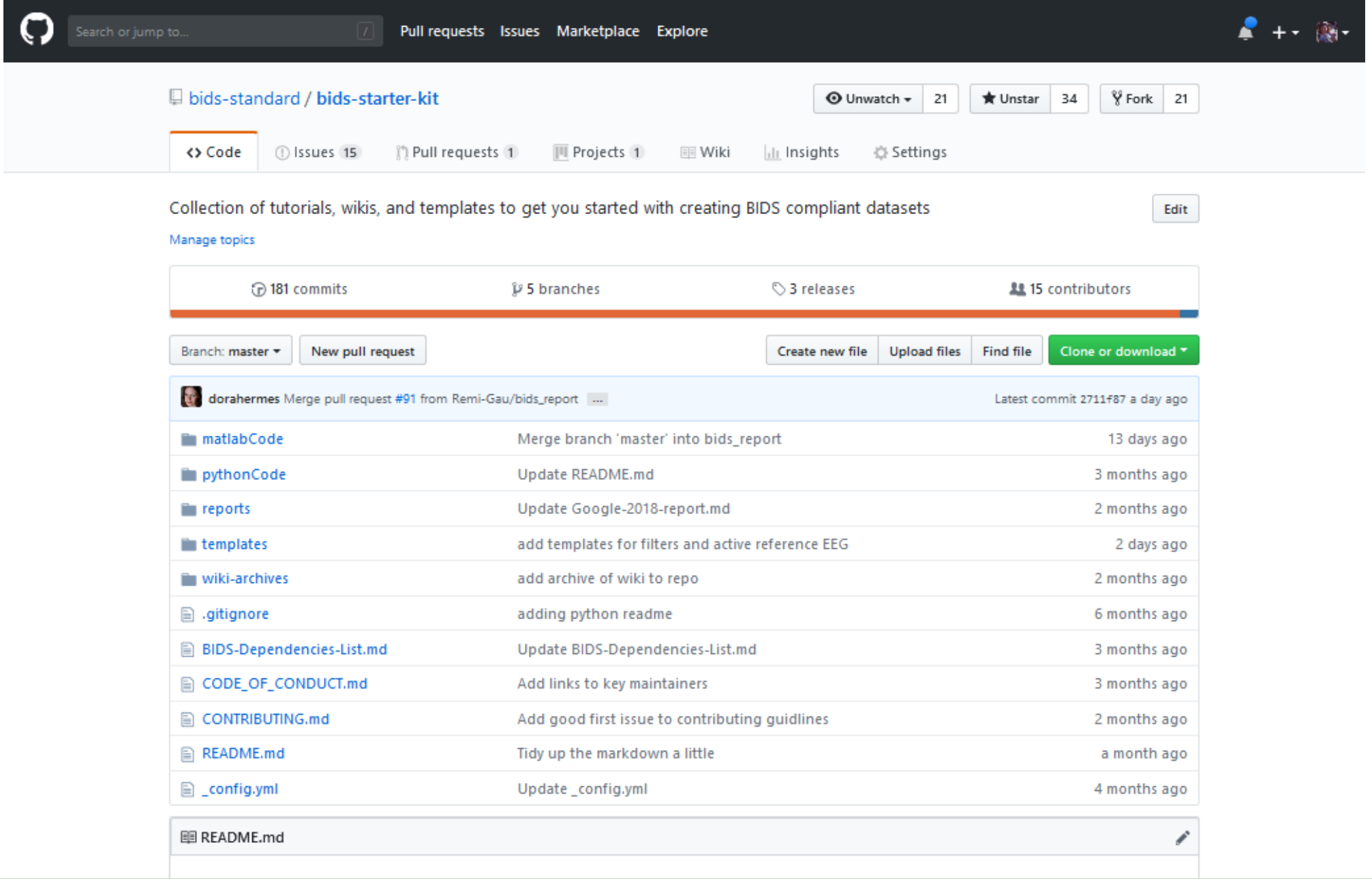

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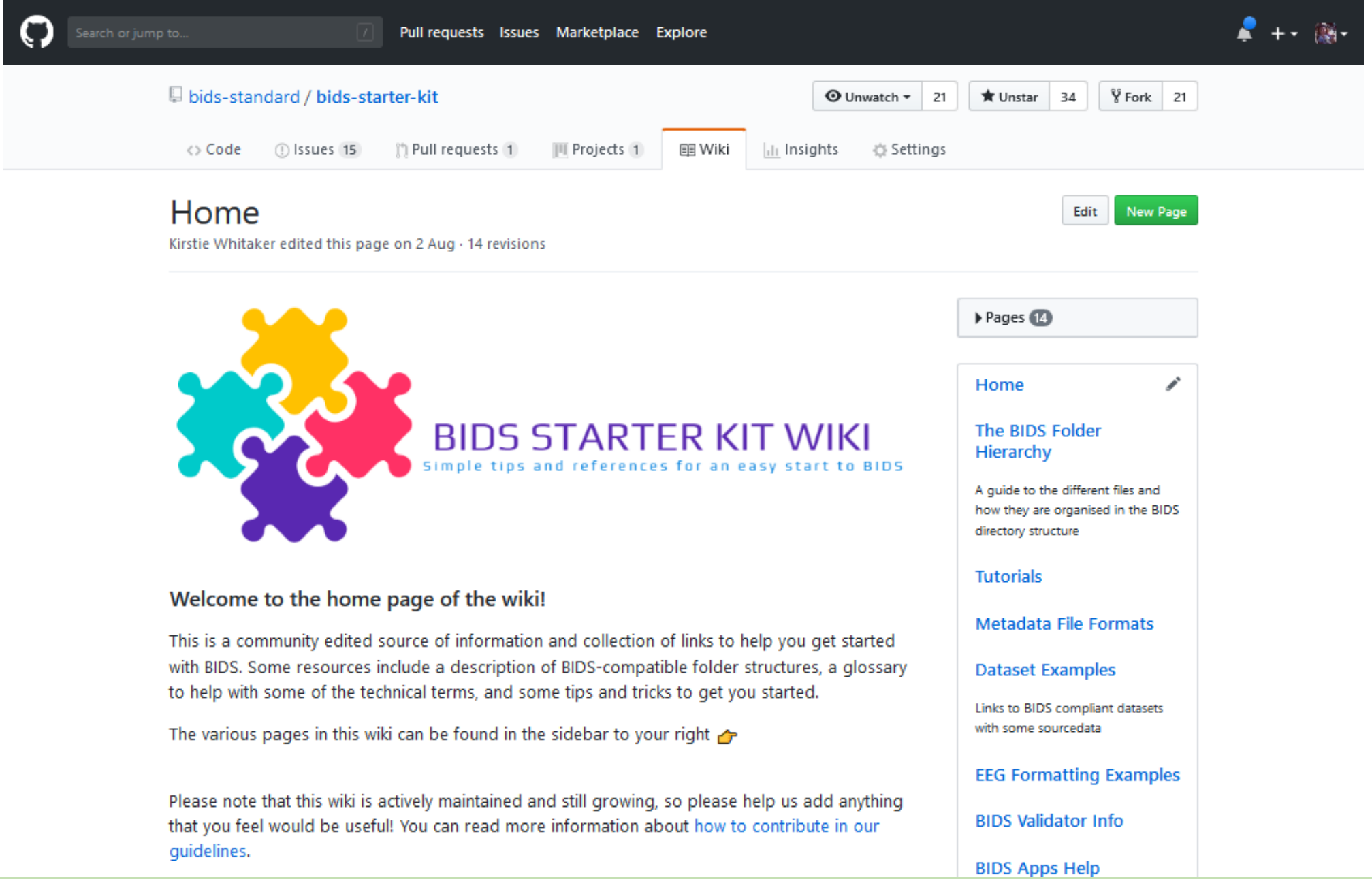

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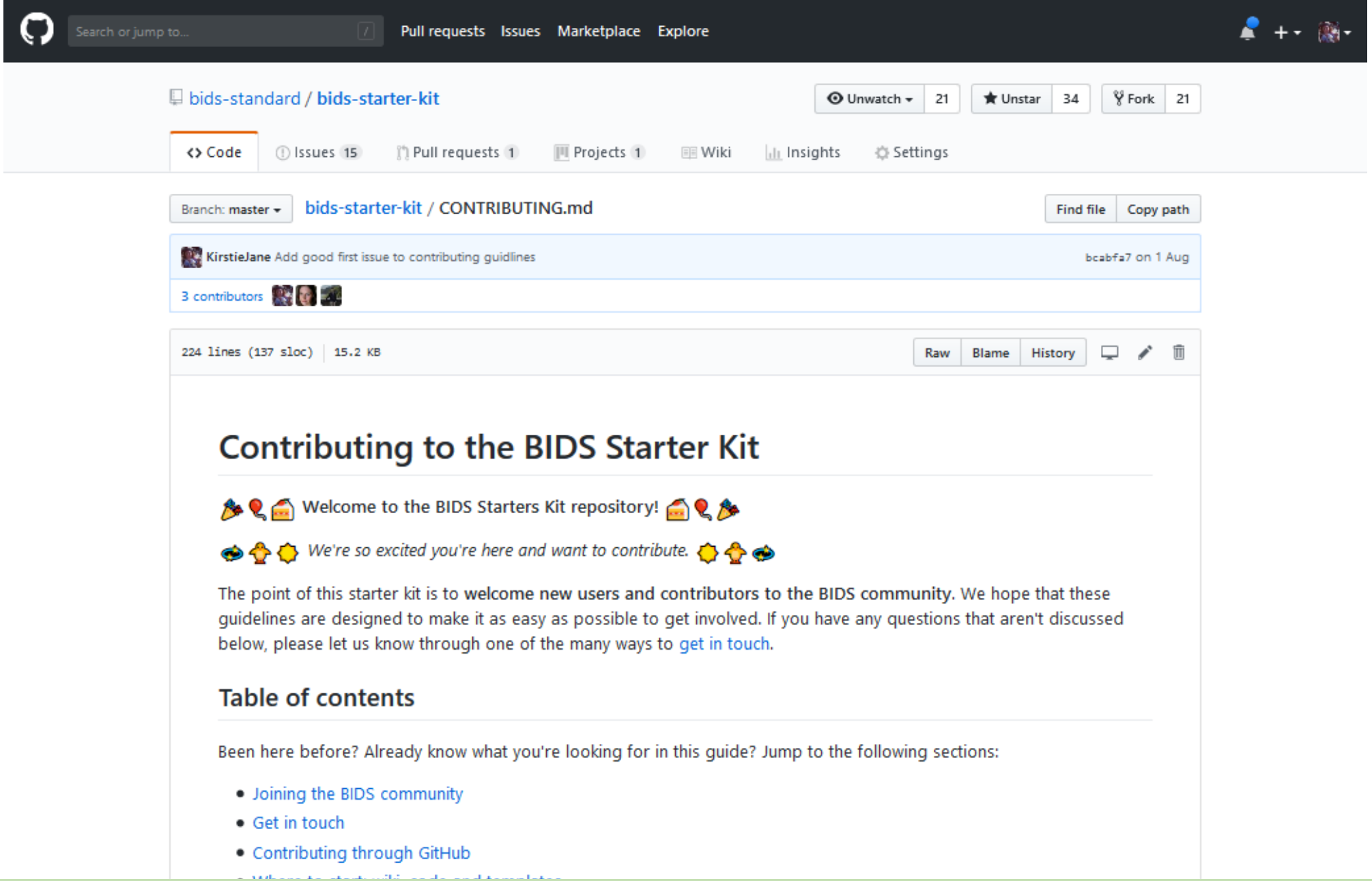

https://github.com/bids-standard/bids-starter-kit/blob/master/CONTRIBUTING.md

Joining the community

BIDS - the Brain Imaging Data Structure - is a growing community of neuroimaging enthusiasts, and we want to make our resources accessible to and engaging for as many researchers as possible.

We therefore require that all contributions **adhere to our** Code of Conduct.

How do you know that you're a member of the BIDS community? You're here! You know that BIDS exists! You're officially a member of the community. It's THAT easy! Welcome!

Get in touch

There are lots of ways to get in touch with the team maintaining the BIDS Starter Kit.

- Our channel in the BrainHack slack team
  - Click here for an invite to the slack workspace
- Our Gitter channel
- The BIDS mailing list
- Via the Neurostars forum.
  - **This is our preferred way to answer questions so that others who have similar questions can benefit too!** Even if your question is not well-defined, just post what you have so far and we will be able to point you in the right direction!
  - Some example questions that have already been answered include: BIDS file naming specifications and BIDS beginner - convert data to BIDS format

If you're here during summer 2018, you should reach out to our lovely Google Summer of Code student Patrick Park. He'll be monitoring all the channels above and it would really help his project along if you said hello and passed along any feedback you have. Don't be shy, the newer you are the more valuable your feedback is

Contributing through GitHub

git is a really useful tool for version control. GitHub sits on top of git and supports collaborative and distributed working.

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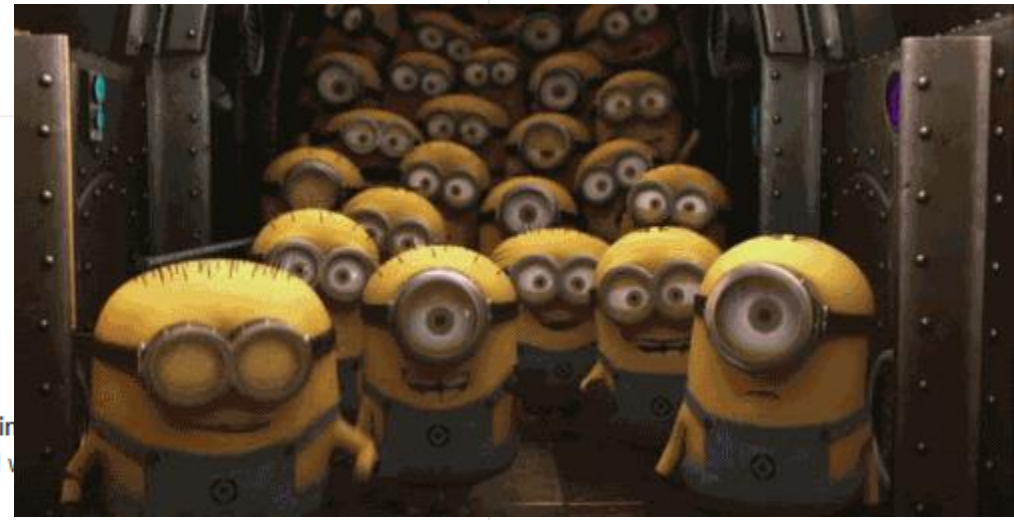

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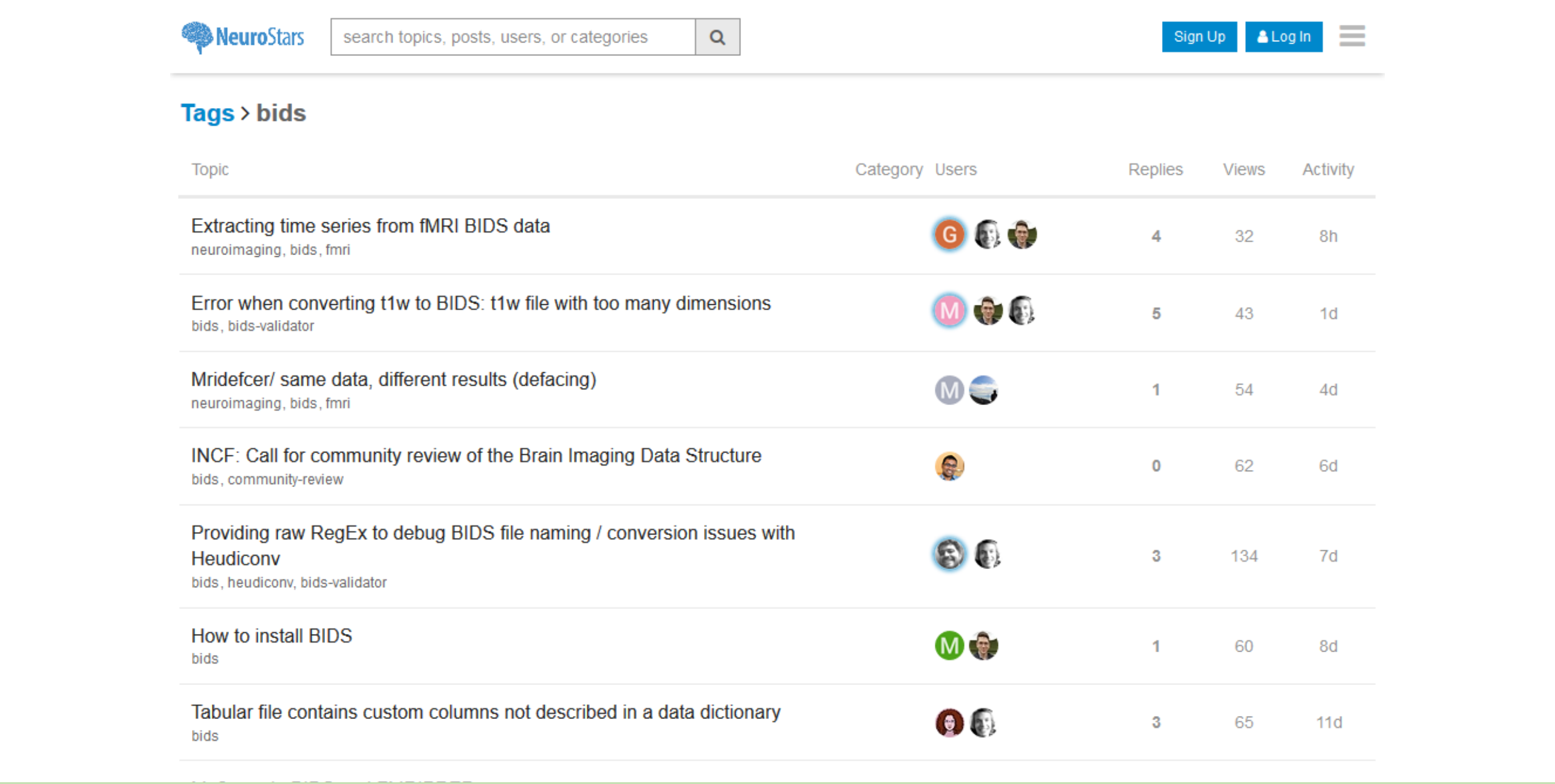

https://neurostars.org/tags/bids

NeuroStars search topics, posts, users, or categories

BIDS format: [CODE1]NOT_INCLUDED

bids

kaylena88 12d

Hello,

I have tried to follow bids format for the field maps that I have acquired for my task-fmri data. To my knowledge I have followed the specifications, however when I use the BIDS validator, it identifies all 256 _epi files with errors. Could you please highlight my error in the naming convention of these files? I have attached an example of the the Error output from the BIDS validator below. Many thanks.

Error 1: [Code 1] NOT_INCLUDED
Files with such naming scheme are not part of BIDS specification. This error is most commonly caused by typos in file names that make them not BIDS compatible. Please consult the specification and make sure your files are named correctly. If this is not a file naming issue (for example when including files not yet covered by the BIDS specification) you should include a ".bidsignore" file in your dataset . Please note that derived (processed) data should be placed in /derivatives folder and source data (such as DICOMS or behavioural logs in proprietary formats) should be placed in the /sourcedata folder.]

sub-01_task-fogplank_dir-down_run-01_epi.json** **0.972 KB | application/json

Location:
bids/sub-01/fmap/sub-01_task-fogplank_dir-down_run-01_epi.json

Reason:
Files with such naming scheme are not part of BIDS specification. This error is most commonly caused by typos in file names that make them not BIDS compatible. Please consult the specification and make sure your files are named correctly. If this is not a file naming issue (for example when including files not yet covered by the BIDS specification) you should include a ".bidsignore" file in your dataset. Please note that derived

Sep 21

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Sep 21

12d ago

https://neurostars.org/tags/bids

BIDS format: [CODE1]NOT_INCLUDED

bids

ChrisGorgolewski Regular 12d

As per specification `fmap/*_epi` files need to follow the following naming convention:

```
sub-<label>[_ses-<session_label>][_acq-<label>]_dir-<dir_label>[_run-<run_index>]_epi.json
```

`task` keyword is not allowed. You need to use

```
sub-01_dir-down_run-01_epi.json
```

file name and use the `IntendedFor` field inside the JSON to specify which bold file this fieldmap data should be used for.

Reply

kaylena88 12d

Thanks for clarifying that, however how do I have the task and rest run-01 files differentiated? The files names will be the same for these fieldmaps?

Thanks

Reply

Remi-Gau 12d

From the specs about fieldmaps

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Sep 21

12d ago

https://neurostars.org/tags/bids

BIDS format: [CODE1]NOT_INCLUDED

bids

Sep 21

Remi-Gau 12d

From the specs about fieldmaps

> Multiple fieldmaps can be stored. In such case the " _run-1 ", " _run-2 " should be used. The optional " acq- " key/value pair corresponds to a custom label the user may use to distinguish different set of parameters.

So AFAIU for example you can use run-01 for task and run-02 for rest and specify which fieldmap goes to which bold runs in the .json file.

Hope it helps.

2 ♡ Reply

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12d ago

Bookmark Share Flag Reply

Normal You will be notified if someone mentions your @name or replies to you.

Suggested Topics

Topic	Category	Replies	Views	Activity

https://neurostars.org/tags/bids

Contributing through GitHub

git is a really useful tool for version control. GitHub sits on top of git and supports collaborative and distributed working.

We know that it can be daunting to start using git and GitHub if you haven't worked with them in the past, but the BIDS Starter Kit maintainers are here to help you figure out any of the jargon or confusing instructions you encounter! ❤️

In order to contribute via GitHub you'll need to set up a free account and sign in. Here are some instructions to help you get going. Remember that you can ask us any questions you need to along the way.

Writing in markdown

GitHub has a helpful page on getting started with writing and formatting on GitHub.

Most of the writing that you'll do will be in Markdown. You can think of Markdown as a few little symbols around your text that will allow GitHub to render the text with a little bit of formatting. For example you could write words as bold (`**bold**`), or in italics (`*italics*`), or as a link (`[link](https://https://youtu.be/dQw4w9WgXcQ)`) to another webpage.

Where to start: wiki, code and templates

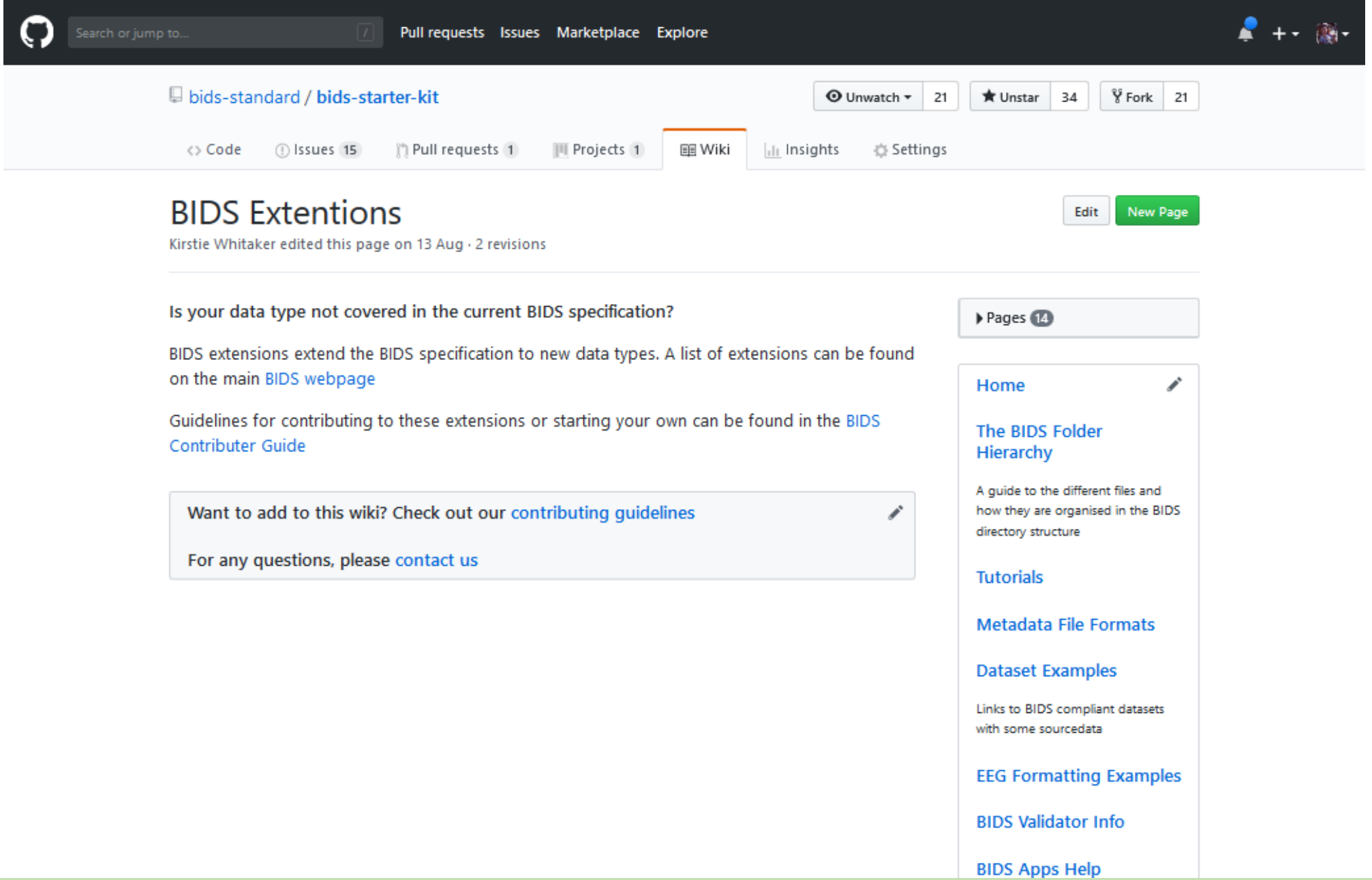
Wiki (link)

We hope that the easiest place to find information about BIDS is the starter kit wiki.

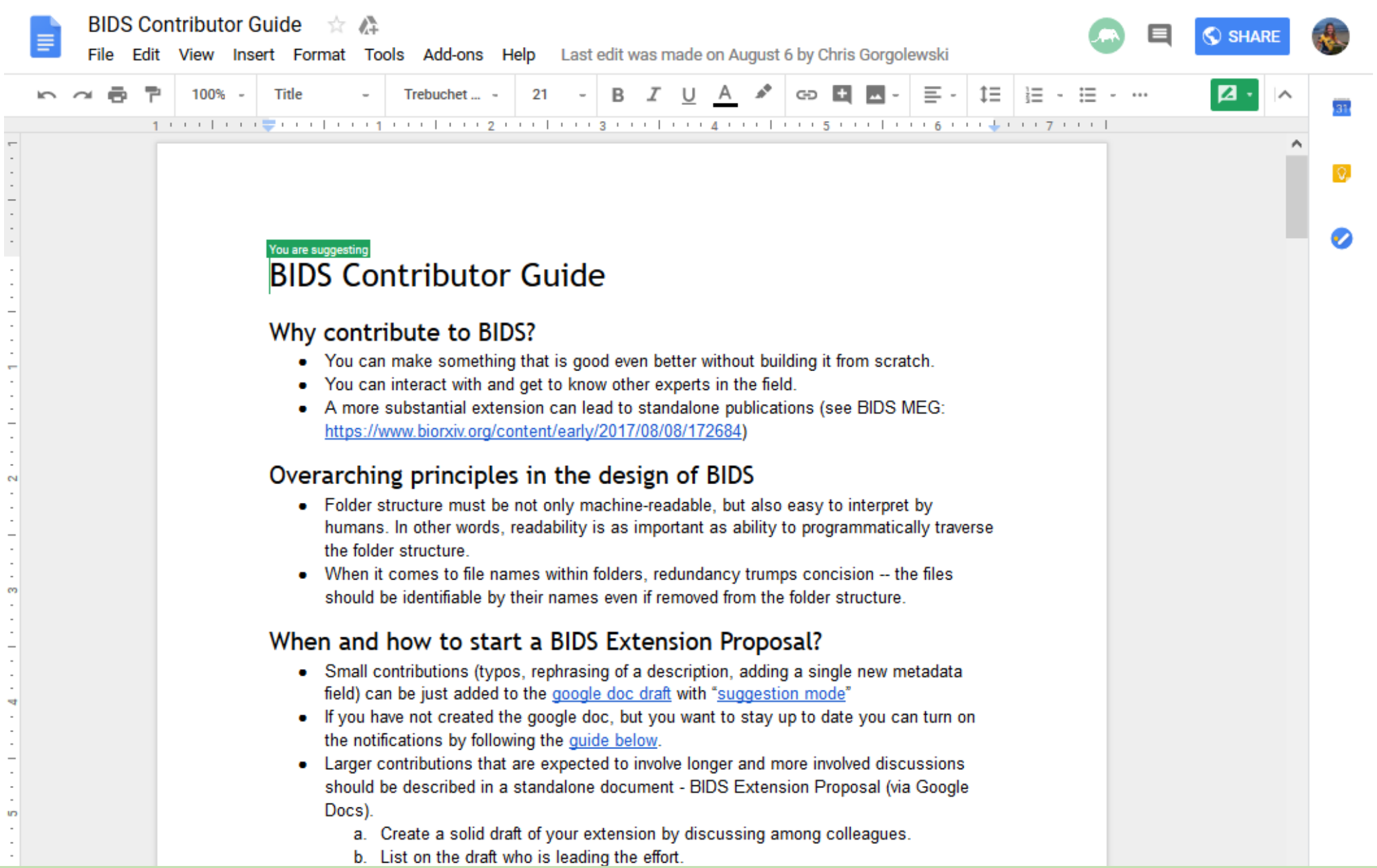
You only need to be logged in to GitHub to edit the wiki. So, there's no need for a pull request if you just want to fix a typo or add a useful link!

Here's a useful introduction to GitHub wikis. Have a read through the pages that already exist in the wiki and please EDIT AWAY! 💪💥✨

https://github.com/bids-standard/bids-starter-kit/blob/master/CONTRIBUTING.md



https://github.com/bids-standard/bids-starter-kit/wiki/BIDS-Extentions



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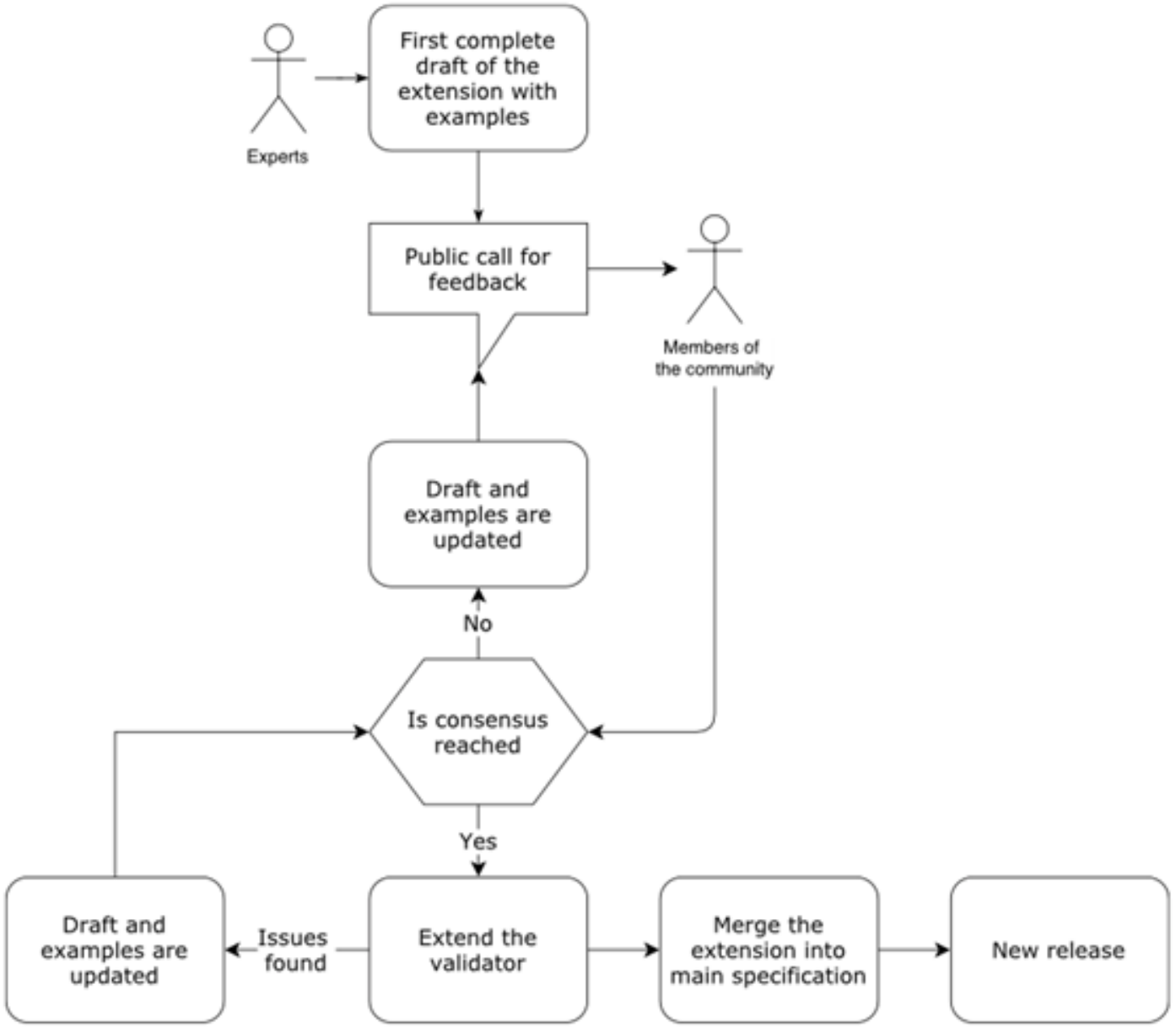

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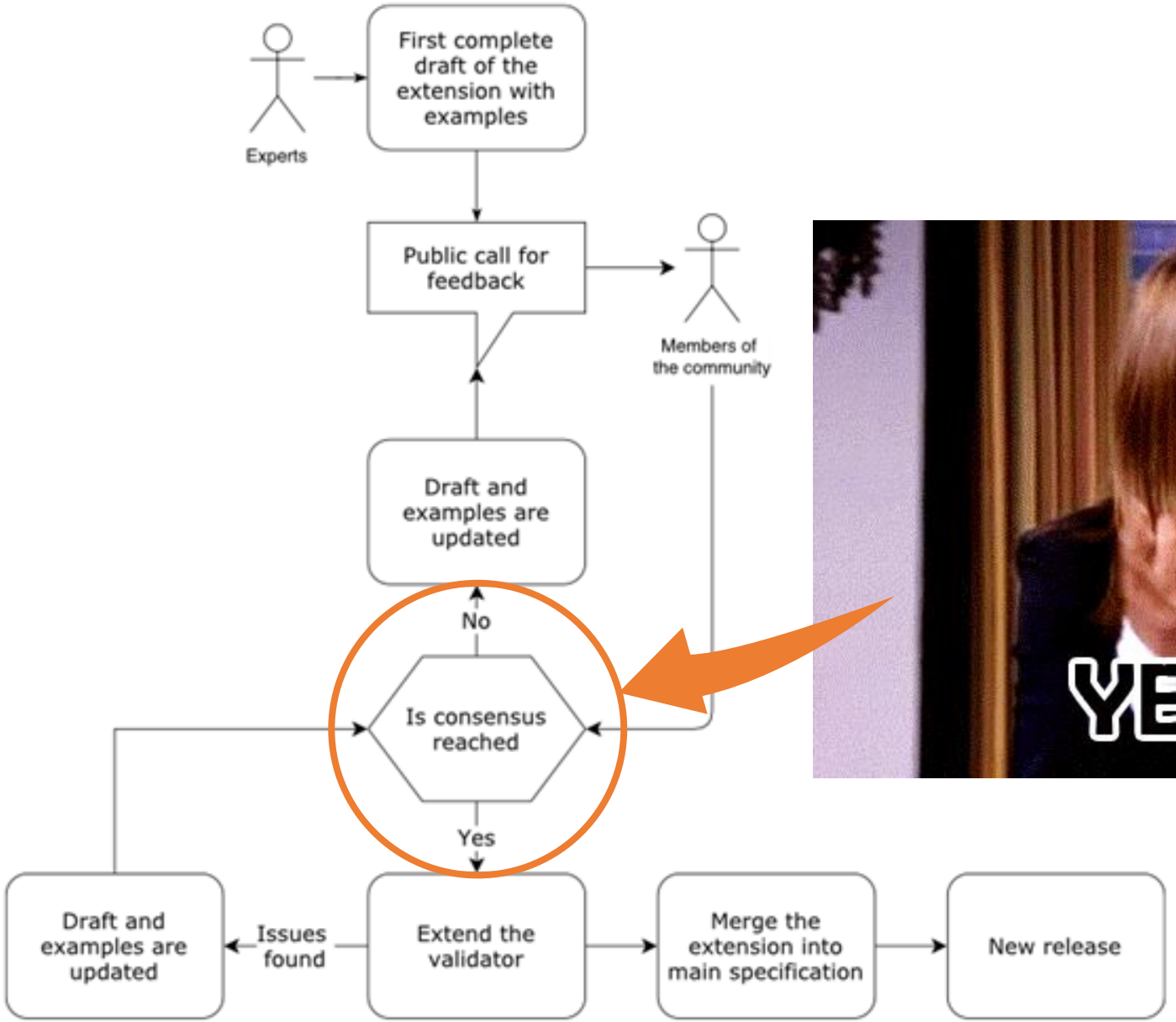

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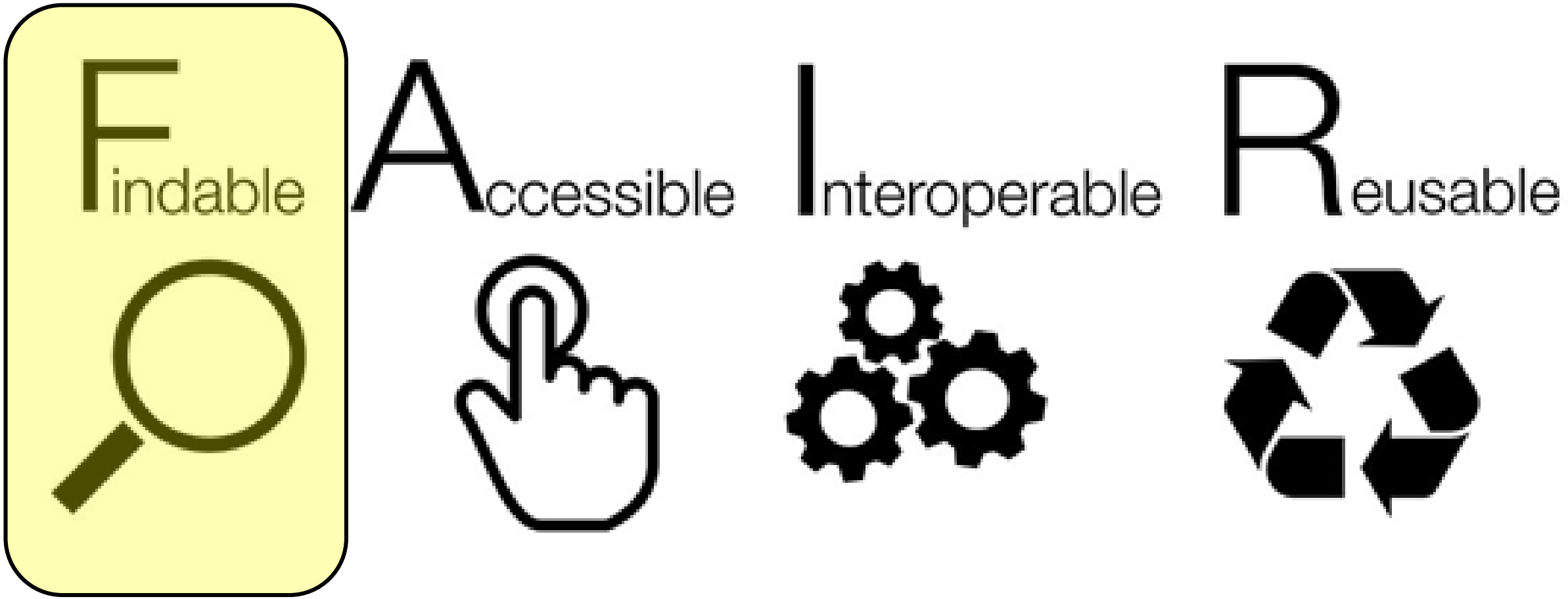

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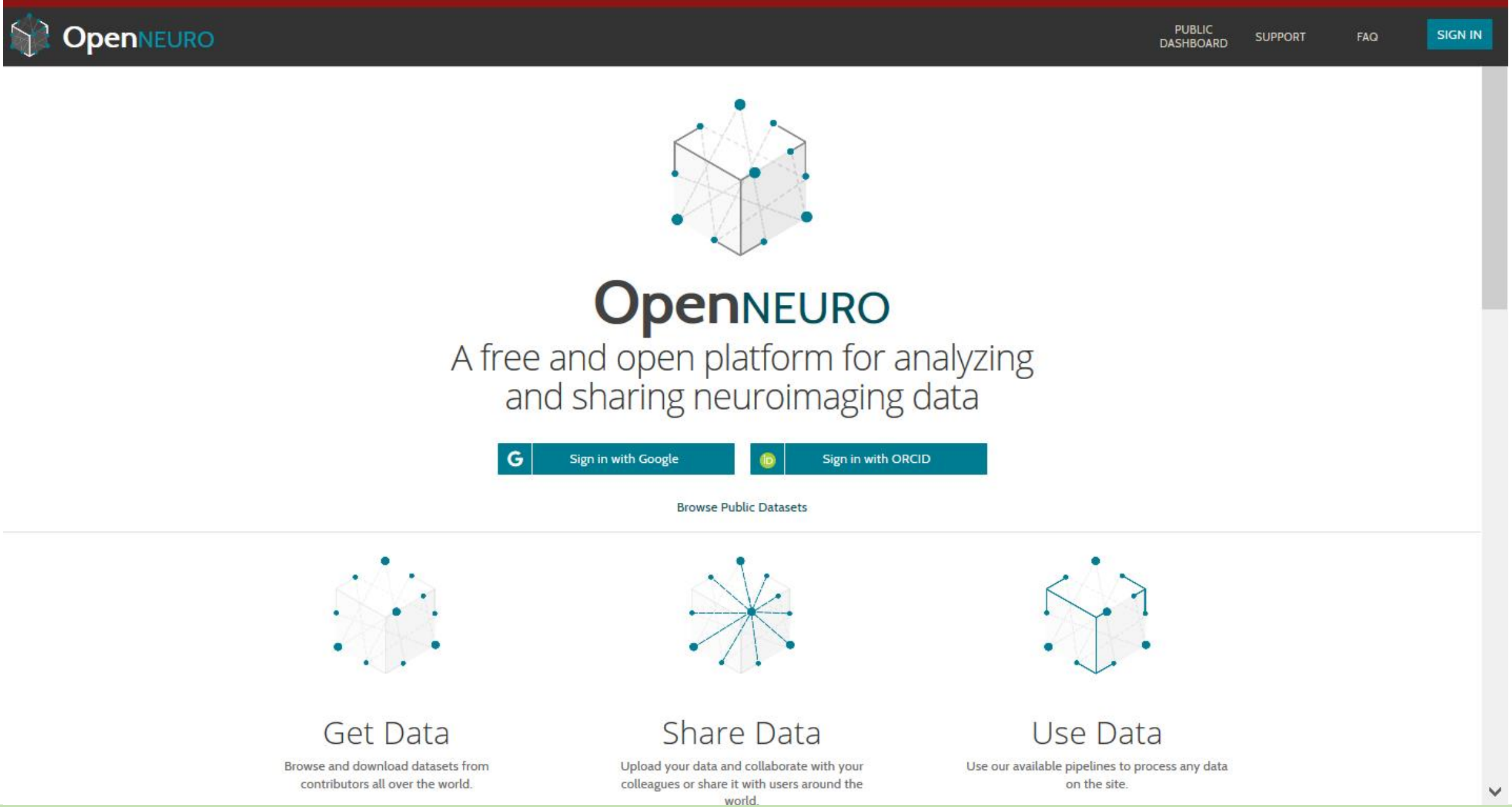

https://openneuro.org

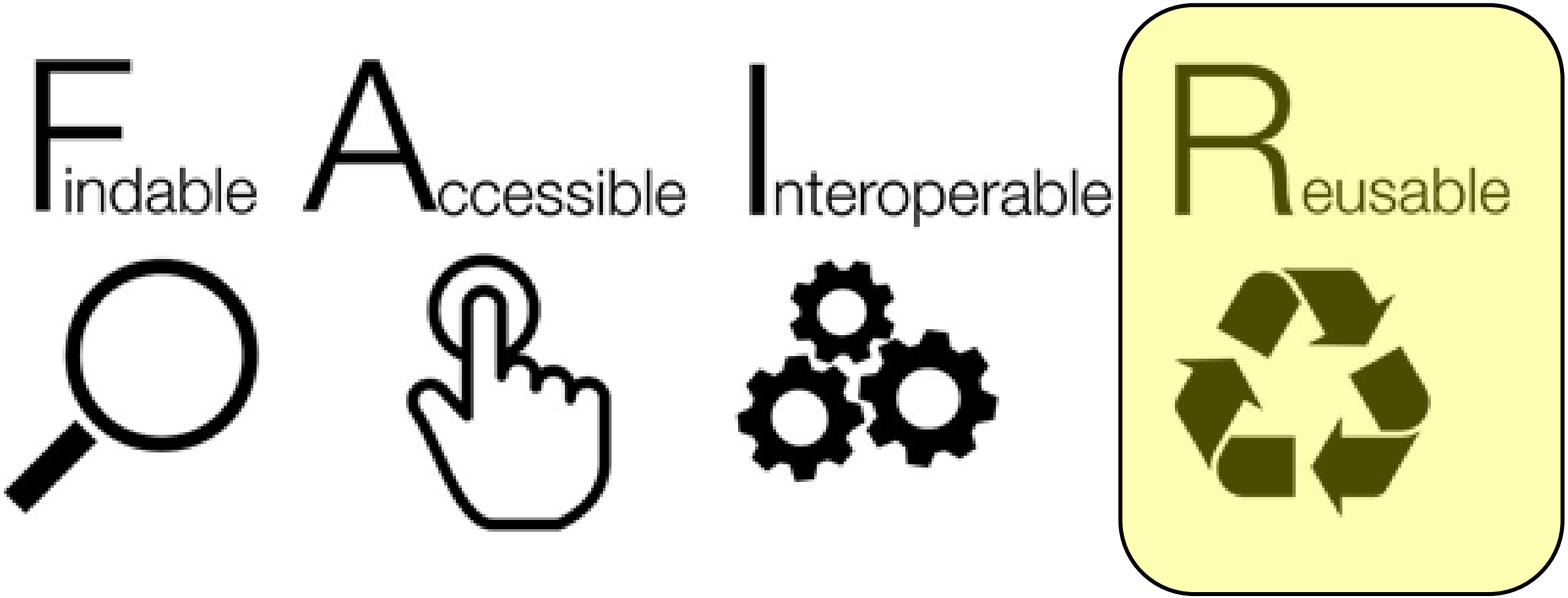

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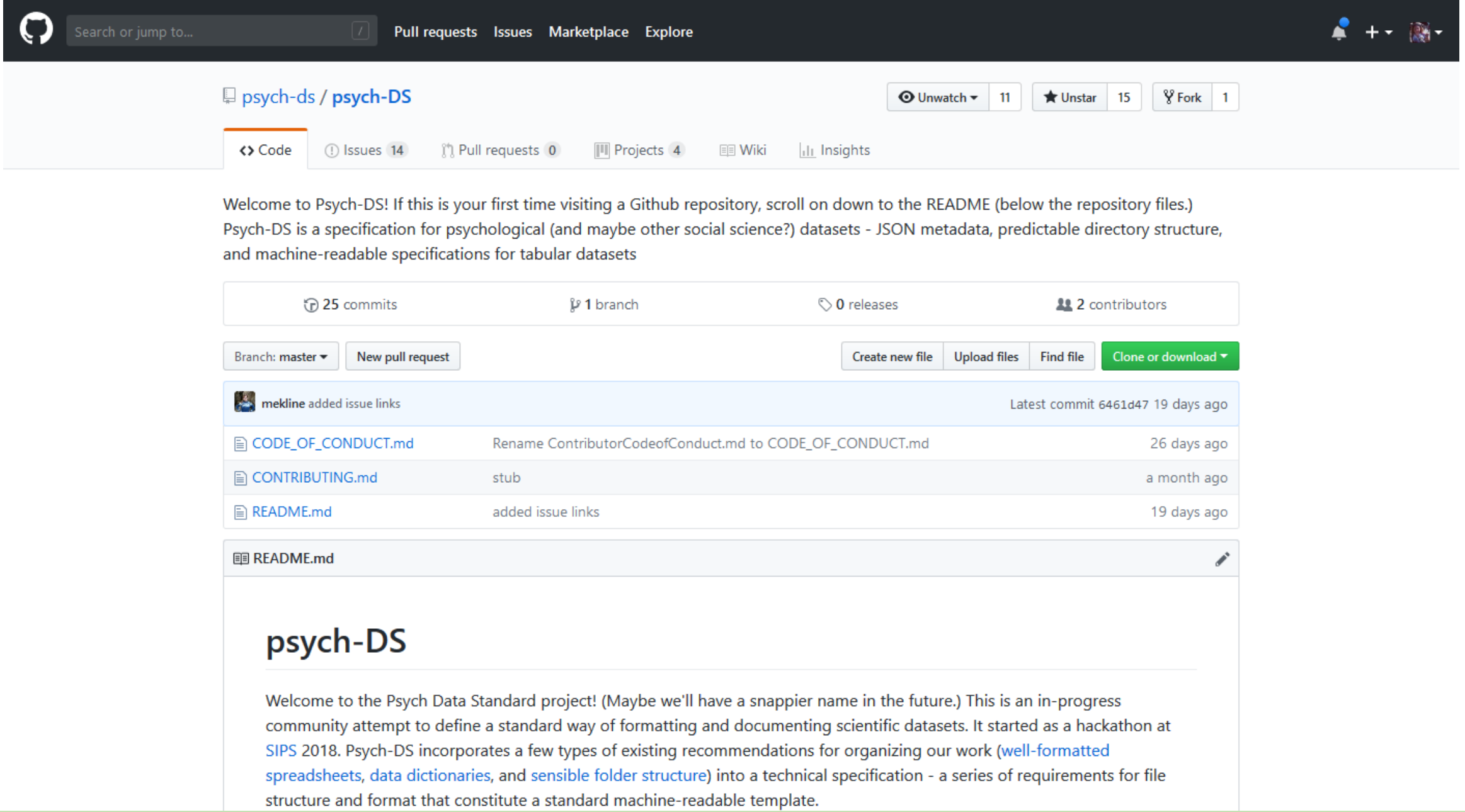
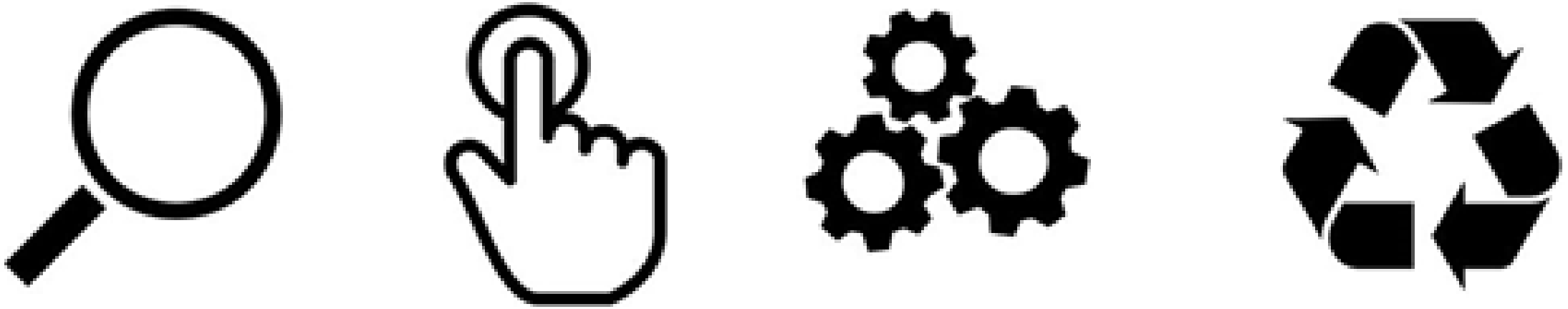
Image credit: Sangya Pundir



https://github.com/psych-ds/psych-DS

Picture credit: Bastian Greshake Tzovaras
https://foundation.mozilla.org/en/opportunity/mozilla-open-leaders

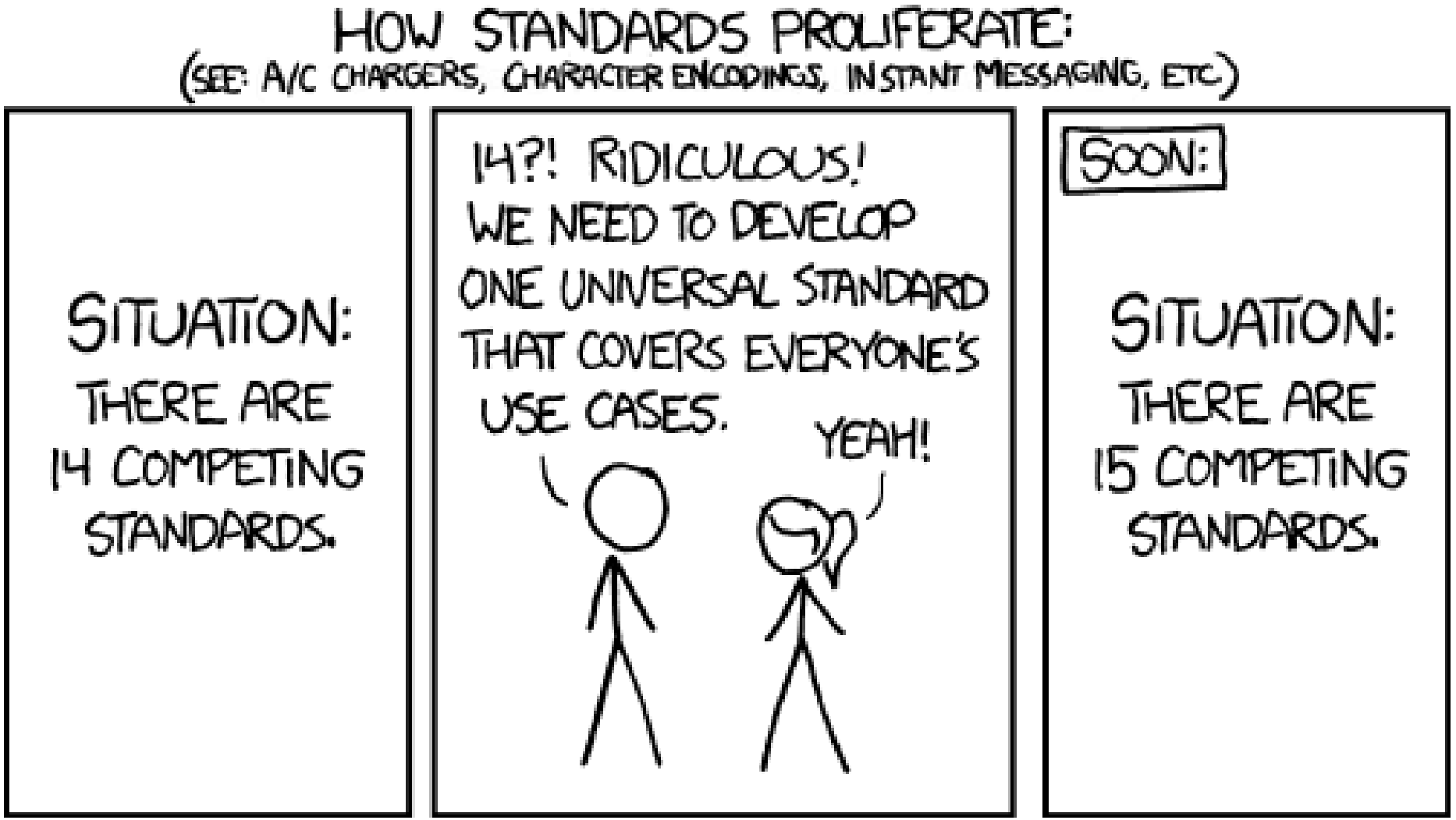
Findable Accessible Interoperable Reusable



Community built standards

Wilkinson, M. D. *et al. Sci. Data* doi: 10.1038/sdata.2016.18 (2016).

Image credit: Sangya Pundir



https://xkcd.com/927

Image credit: Unknown

Appendix I: Contributors

Legend (source: https://github.com/kentcdodds/all-contributors)

Emoji	Represents
💬	Answering Questions (on the mailing list, NeuroStars, GitHub, or in person)
🐛	Bug reports
📝	Blogposts
💻	Code
📖	Documentation and specification
🎨	Design
💡	Examples
📋	Event Organizers
💵	Financial Support
🔍	Funding/Grant Finders
🤔	Ideas & Planning
🚇	Infrastructure (Hosting, Build-Tools, etc)
🔌	Plugin/utility libraries
👀	Reviewed Pull Requests
🔧	Tools
🌍	Translation
⚠️	Tests
✅	Tutorials
📢	Talks
📹	Videos

The following individuals have contributed to the Brain Imaging Data Structure ecosystem (in alphabetical order). If you contributed to the BIDS ecosystem and your name is not listed, please add it.

- Stefan Appelhoff
- Tibor Auer
- Sylvain Baillet
- Elizabeth Bock
- Eric Bridgeford
- Teon L. Brooks
- Suyash Bhogawar
- Vince D. Calhoun
- Alexander L. Cohen
- R. Cameron Craddock
- Samir Das
- Alejandro de la Vega
- Eugene P. Duff
- Elizabeth DuPre
- Eric A. Earl
- Anders Eklund
- Franklin W. Feingold
- Guillaume Flandin
- Remi Gau
- Satrajit S. Ghosh
- Tristan Glatard
- Mathias Goncalves
- Krzysztof J. Gorgolewski
- Alexandre Gramfort
- Yaroslav O. Halchenko
- Daniel A. Handwerker
- Michael Hanke
- Michael P. Harms
- Richard N. Henson
- Dora Hermes
- Katja Heuer
- Chris Holdgraf
- International Neuroinformatics Coordinating Facility
- Mainak Jas
- David Keator
- James Kent
- Gregory Kiar
- Pamela LaMontagne
- Kevin Larcher
- Laura and John Arnold Foundation
- Xiangrui Li
- Vladimir Litvak
- Dan Lurie
- Camille Maumet
- Christopher J. Markiewicz
- Jeremy Moreau
- Zachary Michael
- Michael P. Milham
- Henk Mutsaerts
- National Institute of Mental Health
- B. Nolan Nichols
- Thomas E. Nichols
- Dylan Nielson
- Guiomar Niso
- Robert Oostenveld
- Patrick Park
- Dianne Patterson
- John Pellman
- Cyril Pernet
- Dmitry Petrov
- Russell A. Poldrack
- Jean-Baptiste Poline
- Vasudev Raguram
- Ariel Rokem
- Gunnar Schaefer
- Jan-Mathijs Schoffelen
- Vanessa Sochat
- Francois Tadel
- Roberto Toro
- William Triplett
- Jessica A. Turner
- Joseph Wexler
- Kirstie Whitaker
- Gaël Varoquaux
- Tal Yarkoni

Thank you!

Email: kw401@cam.ac.uk

BIDS website: http://bids.neuroimaging.io

BIDS Starter Kit: https://github.com/bids-standard/bids-starter-kit