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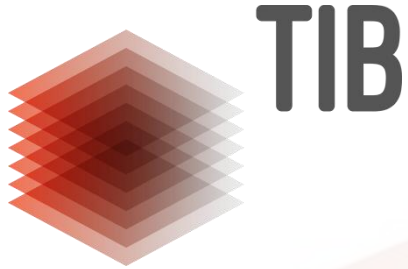


TIB

Publishing Computational Research and Open Science Publishing

CHIST-ERA workshop on Open Science in transnational research, 5.3.2020

Simon Worthington - Twitter @mrchristian99, Open Science Lab, TIB

Leibniz Gemeinschaft

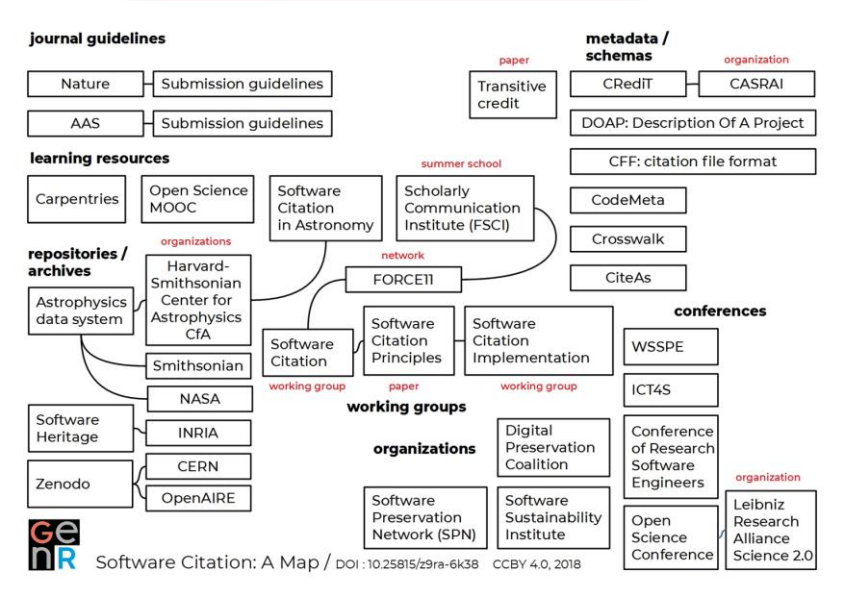
Background

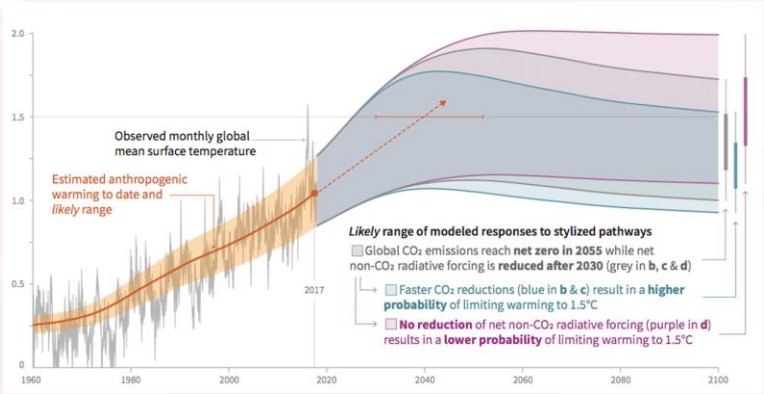
Editor *Generation Research* platform for Leibniz Research Alliance Open Science.
Based at TIB R&D - Open Science Lab.
Researcher working on FOSS publishing microservices architecture and book sprints.
Board member FORCE11.

Generation Research /
a needs based approach to researchers

Software Citation

Imagine if no one had cataloged books for the last 50 years, this is what happened to software!





Climate Change and Open Science - Open Energy Modelling

Open Science is key to having verifiable energy simulations — essential to planning long term government energy policies

Generation Research
genr.eu/

Platforms

Computational research publishing and open science publishing

- Address Open Science questions: replicability, reproducibility, etc
- Real-time runtime environment: software, code, data, paper, etc.
- Jupyter Notebook
- Containerized runtime environments: Binder, Popper, o2r.
- Joining with conventional publishing platforms: PKP + 02r - explored at OJSde workshop Heidelberg UP

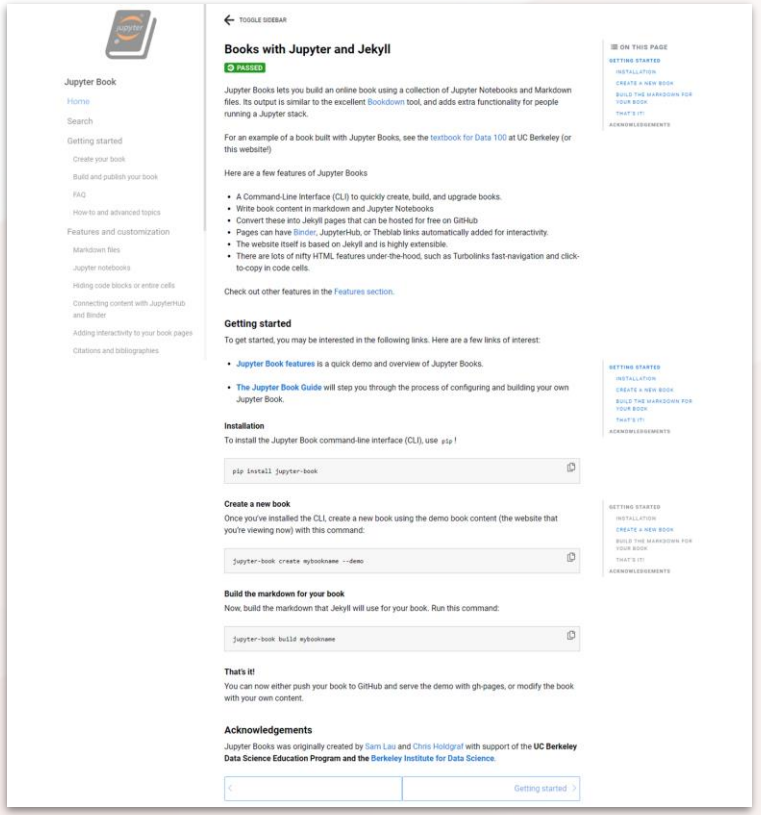


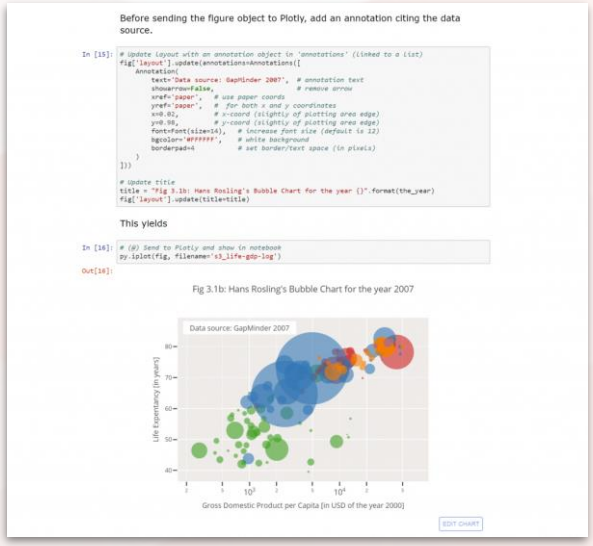
Image:Jupyter Books https://jupyter.org/jupyter-book/intro.html BSD 3-Clause "New" or "Revised" License

Some things about Jupyter Notebooks

Why so popular?

Democratising Data Science

Because you can code, make charts, share and reuse them on the web



Predication

In the near future all papers will be written in Jupyter Notebooks (like) authoring environments

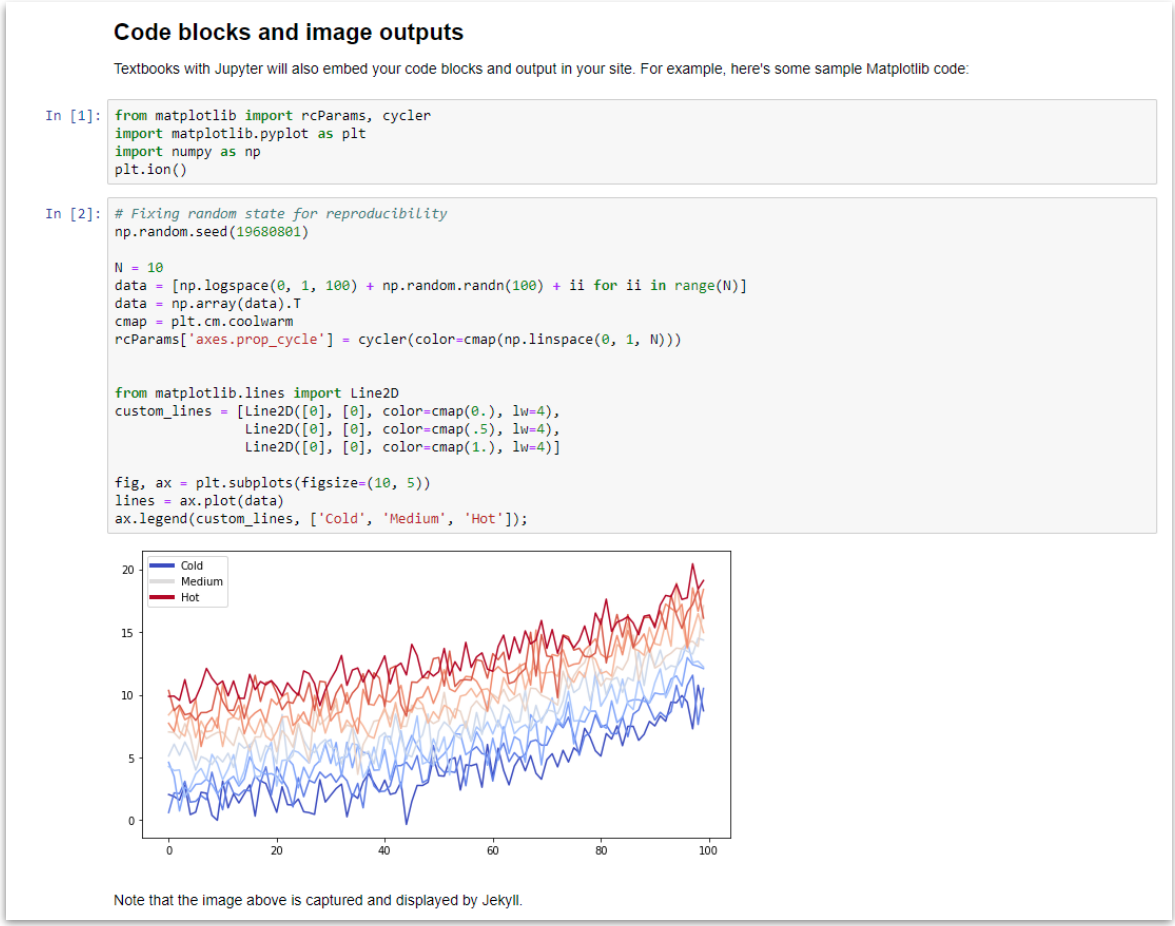
- “reproducibility” as in independent people analyzing the same data
- peer review of data and research

What is Jupyter Notebooks

Jupyter Notebooks are a way in which you can write and execute code in the browser

‘Jupyter Notebooks in Higher Education’ - *GenR*

https://genr.eu/wp/jupyter/



Code blocks and image outputs

Textbooks with Jupyter will also embed your code blocks and output in your site. For example, here's some sample Matplotlib code:

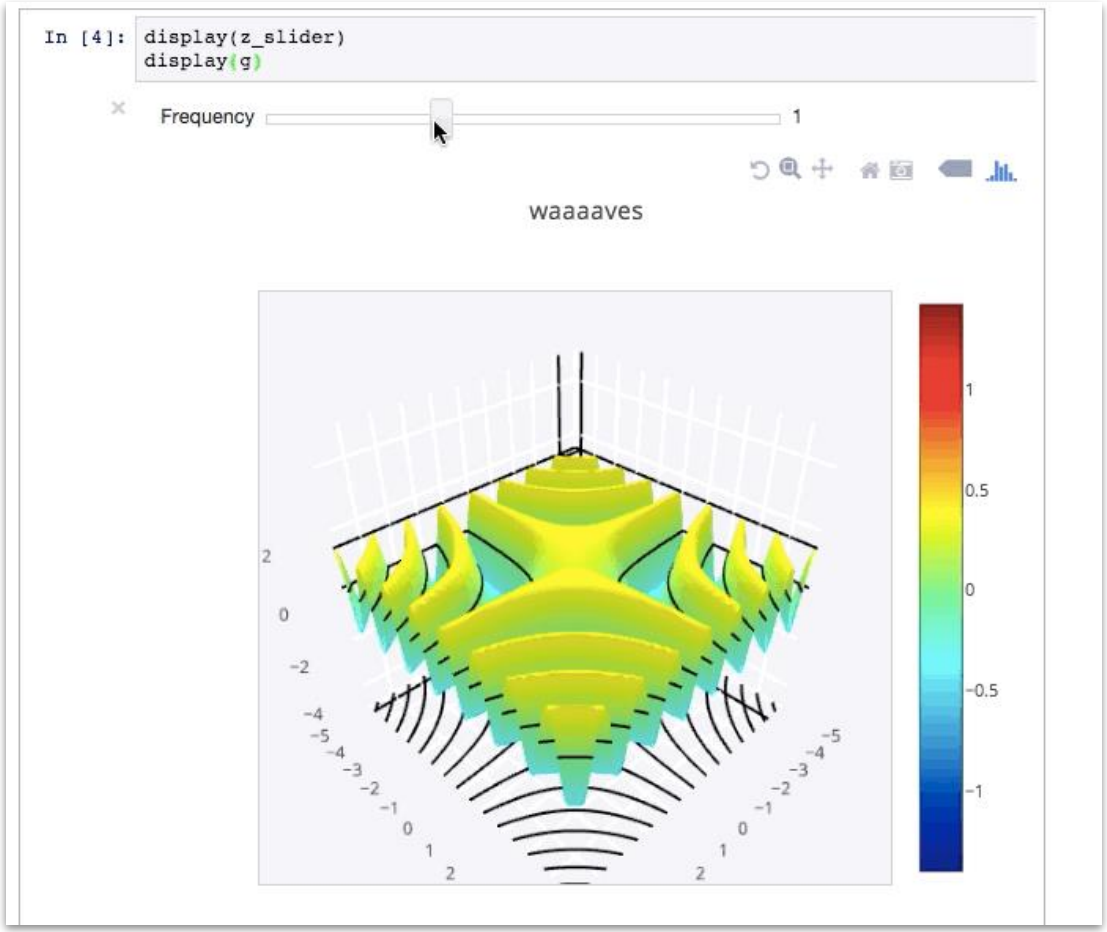
In [1]:
```
from matplotlib import rcParams, cycler
import matplotlib.pyplot as plt
import numpy as np
plt.ion()
```

In [2]:
```
# Fixing random state for reproducibility
np.random.seed(19680801)

N = 10
data = [np.logspace(0, 1, 100) + np.random.randn(100) + ii for ii in range(N)]
data = np.array(data).T
cmap = plt.cm.coolwarm
rcParams['axes.prop_cycle'] = cycler(color=cmap(np.linspace(0, 1, N)))


from matplotlib.lines import Line2D
custom_lines = [Line2D([0], [0], color=cmap(0.), lw=4),
                Line2D([0], [0], color=cmap(.5), lw=4),
                Line2D([0], [0], color=cmap(1.), lw=4)]

fig, ax = plt.subplots(figsize=(10, 5))
lines = ax.plot(data)
ax.legend(custom_lines, ['Cold', 'Medium', 'Hot']);
```


Note that the image above is captured and displayed by Jekyll.

Image: Illustration from *A Personal Computer for Children of All Ages*. ACM, Boston, Alan Kay, 1972. http://www.vpri.org/pdf/hc_pers_comp_for_children.pdf.

Interactive diagrams



Plotly library
https://plot.ly/python/chart-studio/

A research paper in Jupyter

- **Peer review of research**
- **Paper on Arxiv**
- **Experiments and figures as MyBinder**

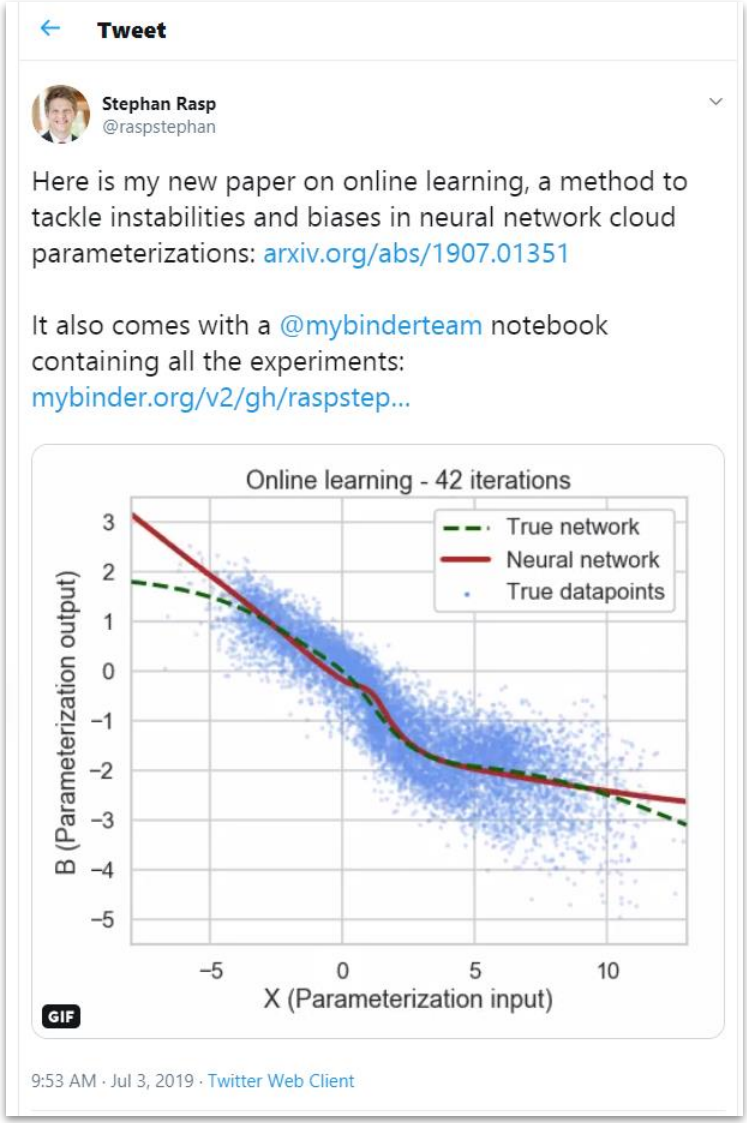
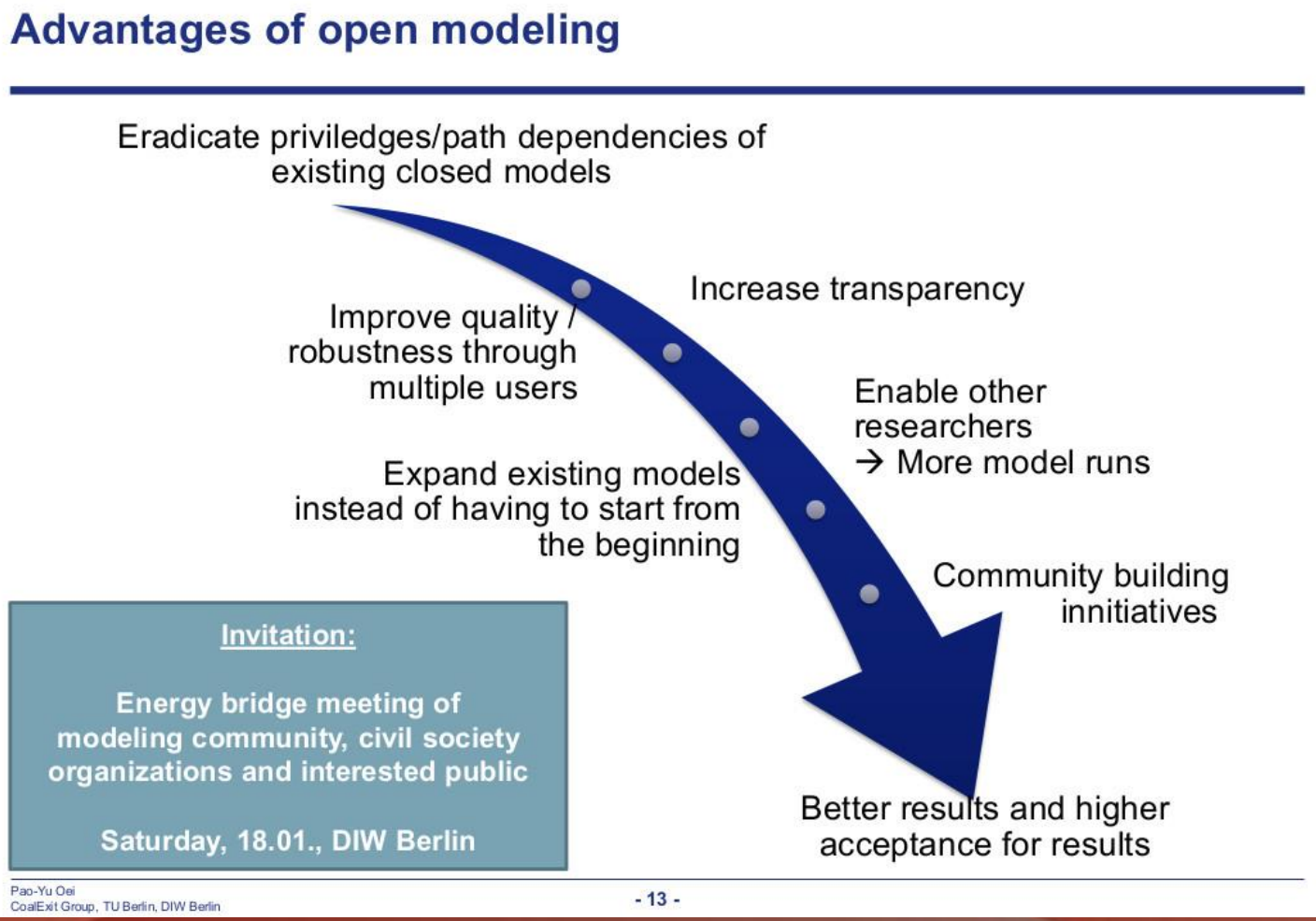


Image: Stephan Rasp @raspstephan 3 July 2019
https://mobile.twitter.com/raspstephan/status/1146325984267898881
https://github.com/raspstephan/Lorenz-Online
https://arxiv.org/abs/1907.01351 Attribution 4.0 International (CC BY 4.0)

Platforms Continued: In context



Open Energy Modelling

Two communities:

- Open Energy Modelling Initiative
- OpenSay

Open Climate Knowledge #OCK

Use data mining and Peter Murray-Rust's ContentMine software make a plan for 100% open research <30% open

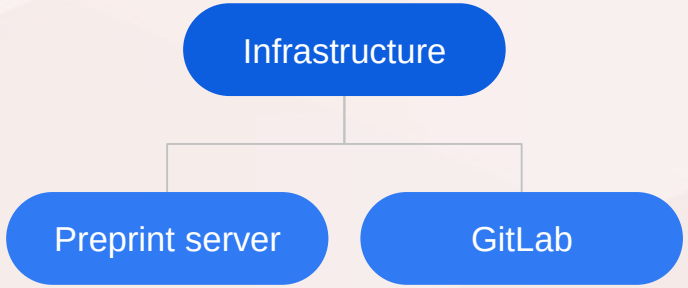
Over the horizon

- **Infrastructure as Code: IasC**
  - Terraform
    Containers, Docker, Kubernetes, cloud provision

- Data mining and semantification of research
  - Powerful APIs: Europe PMC
- Semantification of research: JATS (MECA), knowledge graphs and WikiData
- FOSS
  - Made so that others really can really use: PKP is a good example.
- Research Software Engineering
- Software libraries: e.g., Software Heritage

```
resource "google_container_cluster" "primary" {
  name               = "${var.gke_cluster_name}"
  region             = "${var.gke_cluster_region}"
  initial_node_count = "${var.gke_node_count}"
  min_master_version = "${var.gke_version}"

    labels {
      cluster     = "fiduswriter-runtime"
      environment = "${var.gke_environment}"
    }
  }
```

HashiCorp Terraform



Transnational questions

- PKP OPS/OJS/OMS
  - Translation: Weblate
  - Economic models: AmeliCA
    - free to publish, free to read
- Wikidata stemming words
- Open energy modelling: clear licencing and problems with ambiguous terms and non-profit definitions.
- DOI pairing on translations: FAIR data on FORCE11: FOSTER open science manual
- Economic models of platform provision: PKP

PKP
PUBLIC KNOWLEDGE PROJECT

AmeliCA

WIKIDATA

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Thank you!

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Leibniz Gemeinschaft