Open Science

“Making science more accessible, inclusive and equitable for the benefit of all”

Manuel Alves

(09/Nov/2022)

O que estava previsto:

Acesso aberto de dados
O que é o acesso aberto de dados; plataformas disponíveis para acesso aberto de dados; identificadores e licenças *Creative Commons*.

O que irei abordar (um pouco mais abrangente):

Ciência Aberta (*Open Science*)

https://www.ciencia-aberta.pt/

Política Nacional de Ciência Aberta

Política Nacional de Ciência Aberta

https://www.ciencia-aberta.pt/principios-orientadores

Metas a 3 anos, 2016-2018:

• Adoção e implementação de uma **Política Nacional de Ciência Aberta**;

• Cumprimento a 100% do depósito das publicações científicas resultantes de projetos com financiamento público, num repositório em acesso aberto;

• Cumprimento a 100% da publicação de dados resultantes de projetos com financiamento público, num repositório em acesso aberto;

• Integração do paradigma de ciência aberta no modelo de avaliação da atividade de Investigação e Desenvolvimento pela FCT, incluindo a verificação contínua da publicação de dados e de resultados da investigação financiada com fundos públicos;

• Eliminação do duplo financiamento de publicações/dados em acesso aberto financiados publicamente de forma a racionalizar os custos e o financiamento da ciência;

• Oferta regular de ações de formação e esclarecimento em matéria de publicação de dados e resultados de investigação em acesso aberto, propriedade intelectual e proteção de dados;

• Lançamento de uma programa de apoio ao desenvolvimento de projetos de responsabilidade social científica, a financiar pela FCT;

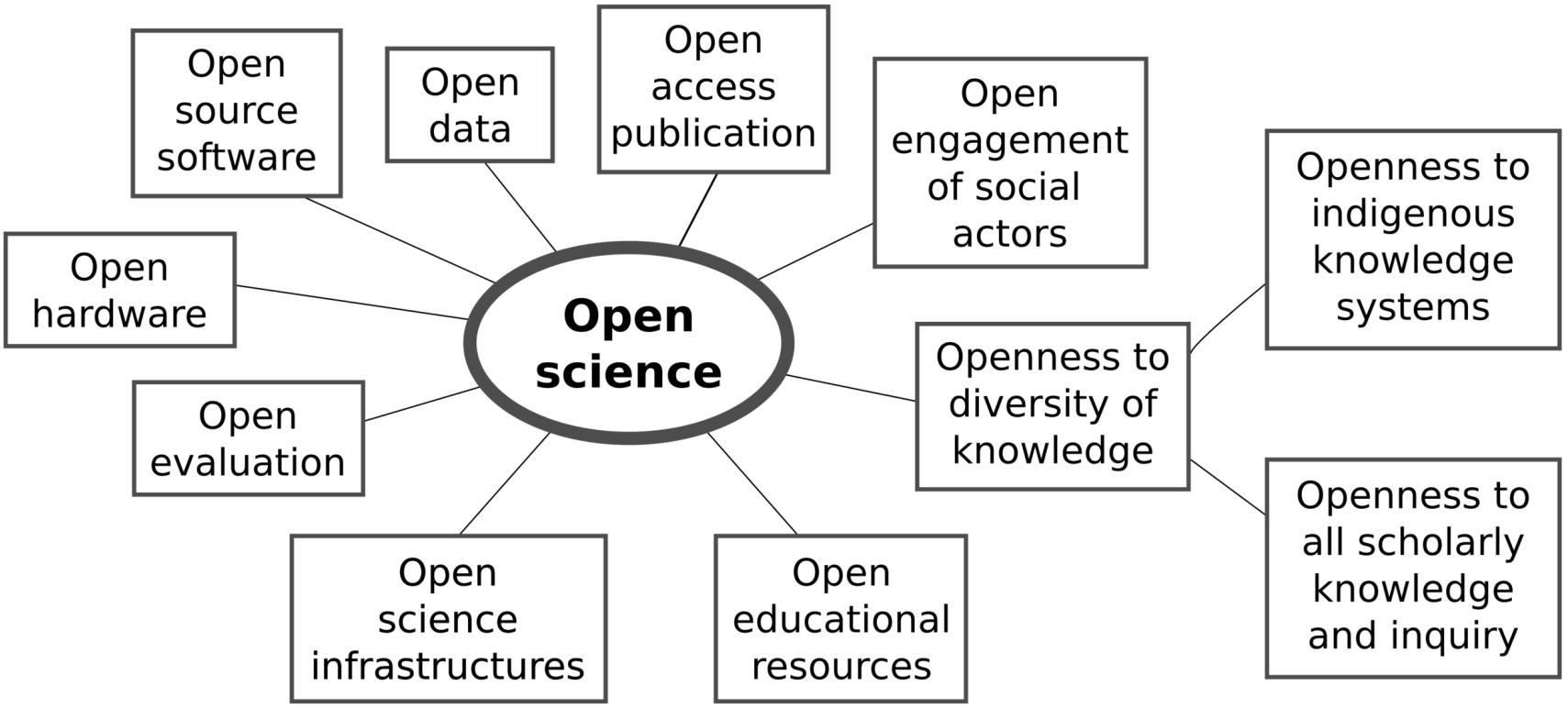
• Colaboração ativa da FCT e da comunidade científica nacional nas políticas e estratégias de ciência aberta no plano europeu, incluindo ao nível do projeto *European Science Cloud*;

• Aprofundamento da colaboração com os países da CPLP no âmbito da ciência aberta, reforçando esta dimensão no âmbito do relançamento do Programa Ciência Global e de iniciativas de apoio ao conhecimento para o desenvolvimento.

Pillars of Open Science

- Open Data
- Open Material / Methodology
- Open Access
- Open Source (software)
- Open Peer Review
- Open Educational Resources

Open science elements based on UNESCO recommendation (2021)



https://en.wikipedia.org/wiki/Open_science

United Nations Educational, Scientific and Cultural Organization (UNESCO) is an agency of the United Nations (UN) aimed at promoting world peace and security through international cooperation in education, arts, sciences, and culture.

Open Science

Organisation for Economic Co-operation and Development (OECD)

Open science encompasses unhindered access to scientific articles, access to data from public research, and collaborative research.

Broadening access to scientific publications and data is at the heart of open science, so that research outputs are in the hands of as many as possible, and potential benefits are spread as widely as possible:

- Open science promotes a **more accurate verification of scientific results**. By combining the tools of science and information technologies, scientific enquiry and discovery can be sped up for the benefit of society.

- Open science reduces duplication in collecting, creating, transferring and re-using scientific material.

- Open science increases productivity in an era of tight budgets.

- Open science results in great innovation potential and increased consumer choice from public research.

- Open science promotes citizens' trust in science. Greater citizen engagement leads to active participation in scientific experiments and data collection.

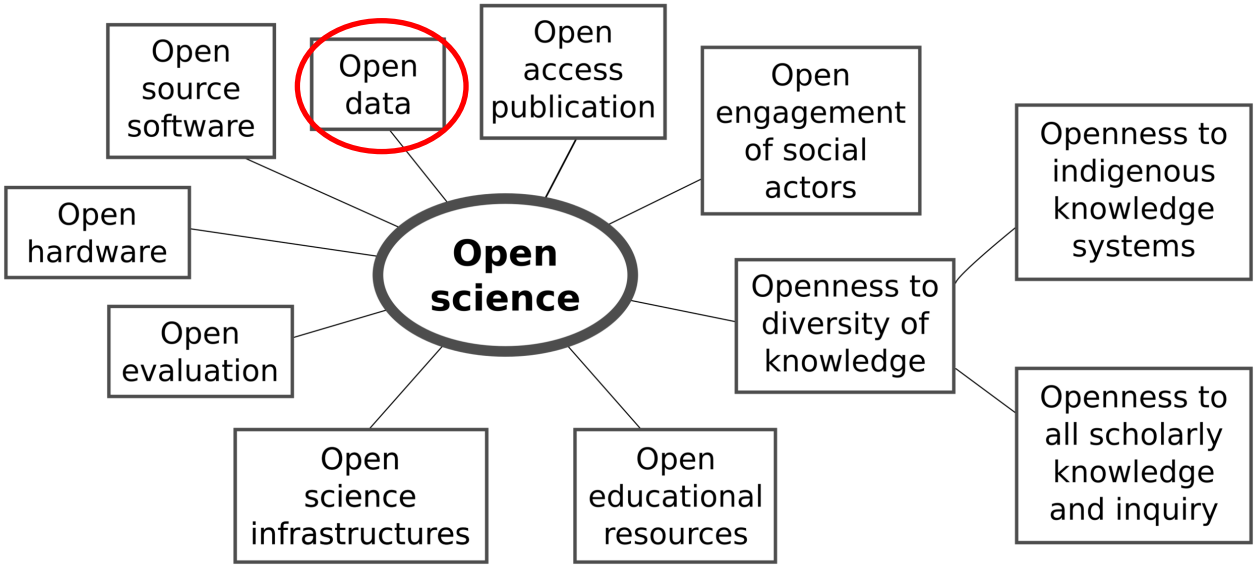
https://www.oecd.org/sti/inno/open-science.htm

FAIR principles

https://www.go-fair.org/fair-principles/

In 2016, the '**FAIR Guiding Principles for scientific data management and stewardship'** were published by Wilkinson *et al*. in *Scientific Data* vol.3, 160018.

Guidelines to improve the
Findability, **A**ccessibility, **I**nteroperability, and **R**euse of digital assets.



https://en.wikipedia.org/wiki/Open_science

European Research Council (ERC)

Information for Applicants to the Starting and Consolidator Grant Calls

Open Science

Open science is a core principle of the ERC. The ERC is committed to the principle of open access to the published output of research, including in particular peer-reviewed articles and monographs. It also supports the basic principle of open access to research data and data related products such as computer code. The ERC considers that providing free online access to all these materials can be the most effective way of ensuring that the fruits of the research it funds can be accessed, read and used as the basis for further research.

Under Horizon Europe, beneficiaries of ERC grants must ensure open access to all peer-reviewed scientific publications[5] relating to their results as set out in the Model Grant Agreement used for ERC actions. Beneficiaries must ensure that they or the authors retain sufficient intellectual property rights to comply with their open access requirements.

In addition, beneficiaries of ERC frontier research grants funded under the Work Programme 2022 will be covered by the provisions on research data management as set out in the Model Grant Agreement used for ERC actions. In particular, whenever a project generates research data, beneficiaries are required to manage it in line with the principles of findability, accessibility, interoperability, and reusability as described by the FAIR principles initiative[6], and establish a data management plan within the first six months of project implementation. Open access to research data should be ensured under the principle 'as open as possible, as closed as necessary'. These provisions are designed to facilitate access, re-use and preservation of the research data generated during the ERC funded research work.

https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/information-for-applicants_he-erc-stg-cog_en.pdf

Data Availability Statements (in journal publications)

SPRINGER NATURE

The Springer Nature research data policy types 2, 3 and 4 encourage or require the provision of data availability statements. Some research funders, such as the Research Councils UK, require data availability statements to be included in publications and the Springer Nature research data policies support compliance with these requirements. Publicly available datasets referred to in data availability statements can also be cited in reference lists – and this is particularly encouraged when datasets have digital object identifiers (DOIs). Data availability statements commonly take one of the following forms:

1. The datasets generated during and/or analysed during the current study are available in the [NAME] repository, [PERSISTENT WEB LINK TO DATASETS].

2. The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

3. All data generated or analysed during this study are included in this published article (and its supplementary information files).

4. The datasets generated during and/or analysed during the current study are not publicly available due to [REASON(S) WHY DATA ARE NOT PUBLIC] but are available from the corresponding author on reasonable request.

5. Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

6. The data that support the findings of this study are available from [THIRD PARTY NAME] but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of [THIRD PARTY NAME].

https://www.springernature.com/gp/authors/research-data-policy/data-availability-statements/12330880

Global registry of research data repositories

FAIRsharing.org
standards, databases, policies

re3data.org
REGISTRY OF RESEARCH DATA REPOSITORIES

Some generalist data repositories:

- 4TU.ResearchData
- ANDS contributing repositories
- Dryad Digital Repository
- Figshare
- Harvard Dataverse
- Mendeley Data
- Open Science Framework
- Science Data Bank
- Zenodo
- Code Ocean (with code)

Example: Harvard Dataverse Repository

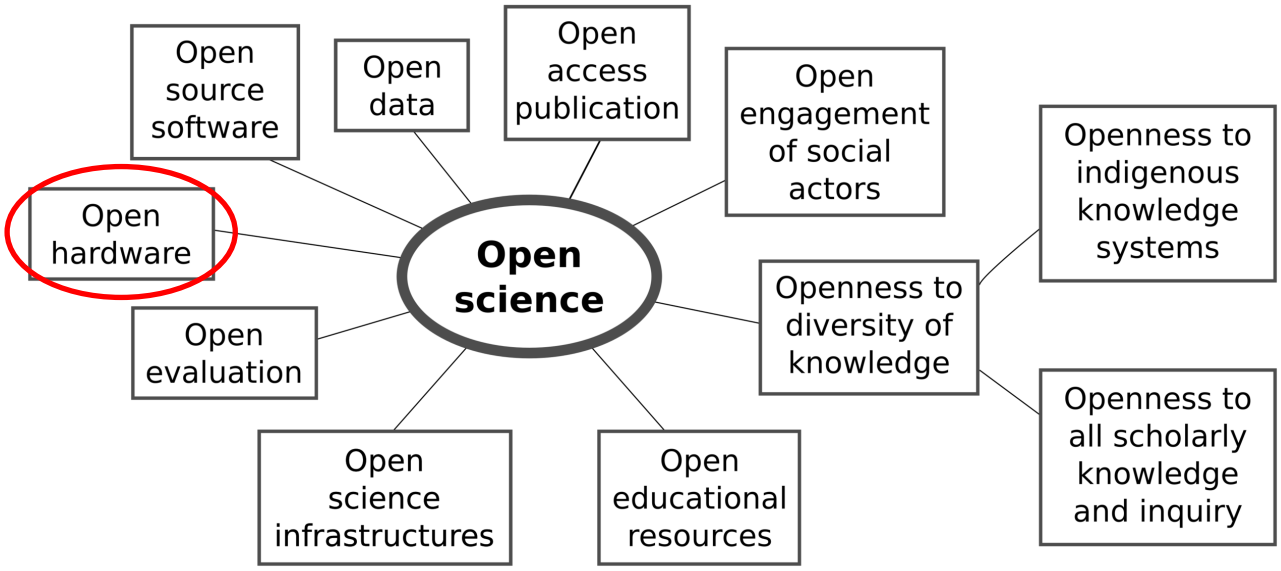
https://www.youtube.com/watch?v=MPQ0Tpgaxt0

Open source hardware

Open-source hardware (**OSH**) consists of physical artifacts of technology designed and offered by the open-design movement. Both free and open-source software (FOSS) and open-source hardware are created by this open-source culture movement and apply a like concept to a variety of components.

It is sometimes, thus, referred to as **FOSH** (free and open-source hardware).

[https://en.wikipedia.org/wiki/Open-source_hardware]



https://en.wikipedia.org/wiki/Open_science

open source hardware

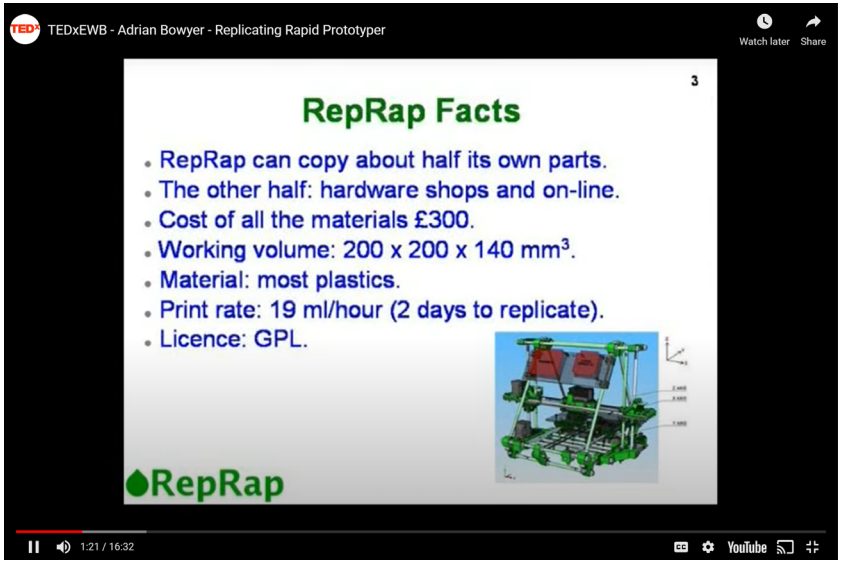
Open source hardware

The origins of 3D printers… the famous RepRap
(project started in 2005, Univ. Bath, UK)

RepRap was the first of the low-cost 3D printers, and the RepRap Project started the open-source 3D printer revolution.

RepRap is about making self-replicating machines, and making them freely available for the benefit of everyone.

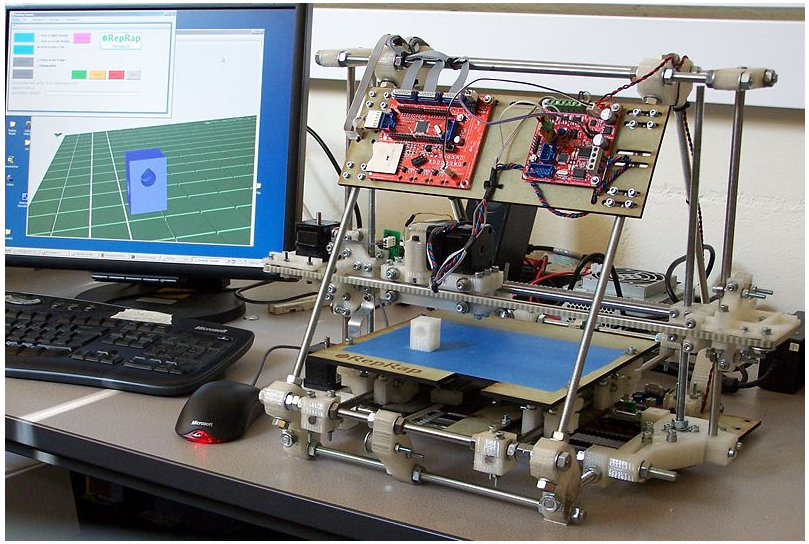
https://reprap.org/wiki/RepRap



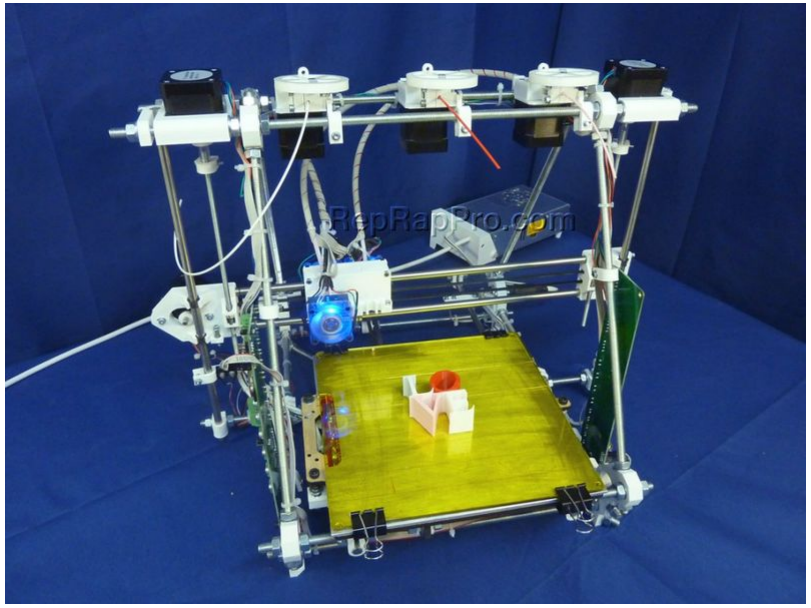
Open source labs

Use of open-source electronics and 3D printing to make open-source labs.

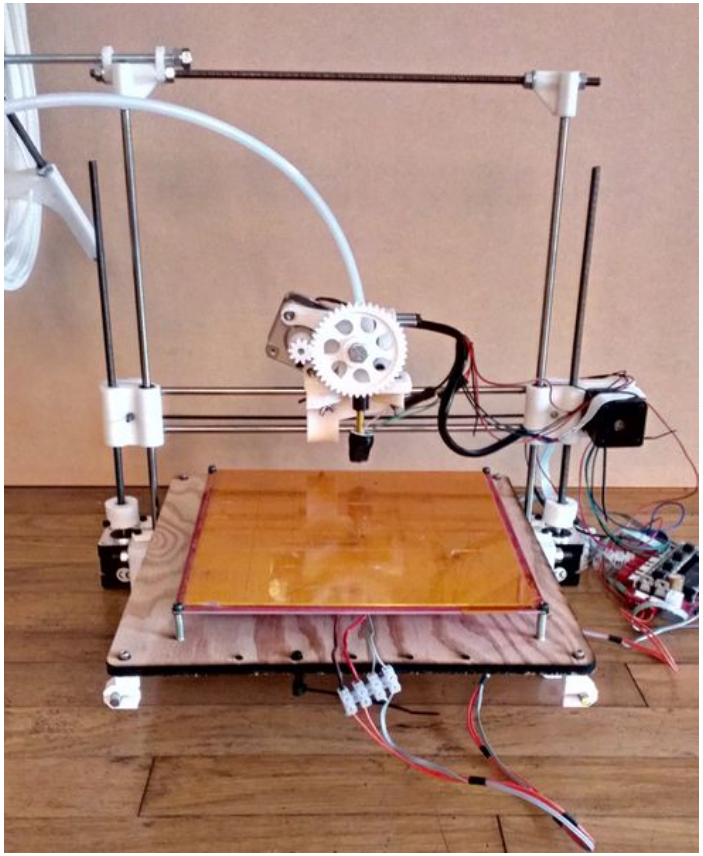
Original Mendel



RepRapPro Tricolour Mendel



Wallace



https://reprap.org/wiki/Build_A_RepRap

Open Source Toolkit

A global forum for open source hardware and software research and applications.

The Open Source Toolkit features articles and online projects describing hardware and software that can be used in a research and/or science education setting across different fields, from basic to applied research.

The Open Source movement revolutionized the way computer systems were developed and how companies made their businesses. Its philosophy requires that all source code should be freely shared, so that as many people as possible can use, change, learn, and improve upon it.

This movement made its way into academia and several open source packages are available for scientists.
In recent years, the increasing availability and low cost of electronic components, processors and 3D printers meant that an open model of development has taken root also in the world of hardware, including the development of scientific lab equipment.

The implications for research can hardly be overstated: “Open Labware” designs are almost always cheaper than “closed source” ones, allow for distributed development and, critically, customization by the end user, the lab scientist.

Thank you note from the future for practicing Open Science

https://www.youtube.com/watch?v=Igsi8c4BjI8

Open-Labware.net

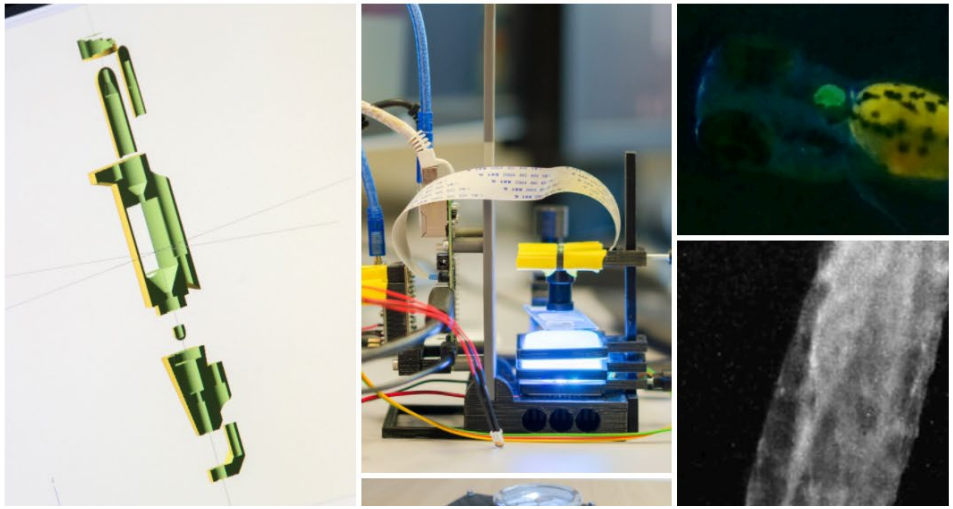
3-D print your own lab equipment

Home Projects Education Links About

Home

>>> This site is migrating to here <<<

Open-Labware.net is a collaborative spin-off project of TReND in Africa, OpenNeuroscience and the Baden lab. Here, we present our designs and modifications of Free and Open Source Hardware projects specifically intended to be used in a scientific lab or research setting.



Projects

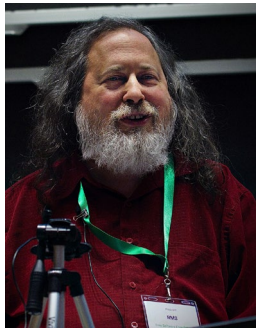
- FlyPi
- Openspritzer
- Spikeling
- Biropettes
- Hyperspectral Scanner
- Micromanipulator
- PhoneScope

News

- 2 New projects added!
- FlyPi gets >28,000 hits in the first 6 months!
- Prometheus Science launched!
- FlyPi published in PLoS Biology
- Our 100 Euro Lab "FlyPi" finally out on bioRxiv

https://open-labware.net/

Free and Open source software



Richard Stallman

GNU manifesto
1985

Free and open-source software (FOSS) is software that is both free software and open-source software where anyone is freely licensed to use, copy, study, and change the software in any way, and the source code is openly shared so that people are encouraged to voluntarily improve the design of the software.

The Four Essential Freedoms of Free Software

- The freedom to run the program as you wish, for any purpose (freedom 0).
- The freedom to study how the program works, and change it so it does your computing as you wish (freedom 1). Access to the source code is a precondition for this.
- The freedom to redistribute copies so you can help your neighbour (freedom 2).
- The freedom to distribute copies of your modified versions to others (freedom 3). By doing this you can give the whole community a chance to benefit from your changes. Access to the source code is a precondition for this.

https://en.wikipedia.org/wiki/Free_and_open-source_software
https://en.wikipedia.org/wiki/The_Free_Software_Definition

The following operating systems are released under free software licenses:

Mobile operating systems:

- Android and forks:
  - LineageOS
  - Replicant
  - /e/
- Ubuntu Touch
- PostmarketOS
- Plasma Mobile
- PureOS

https://en.wikipedia.org/wiki/Portal:Free_and_open-source_software

Copyleft symbol

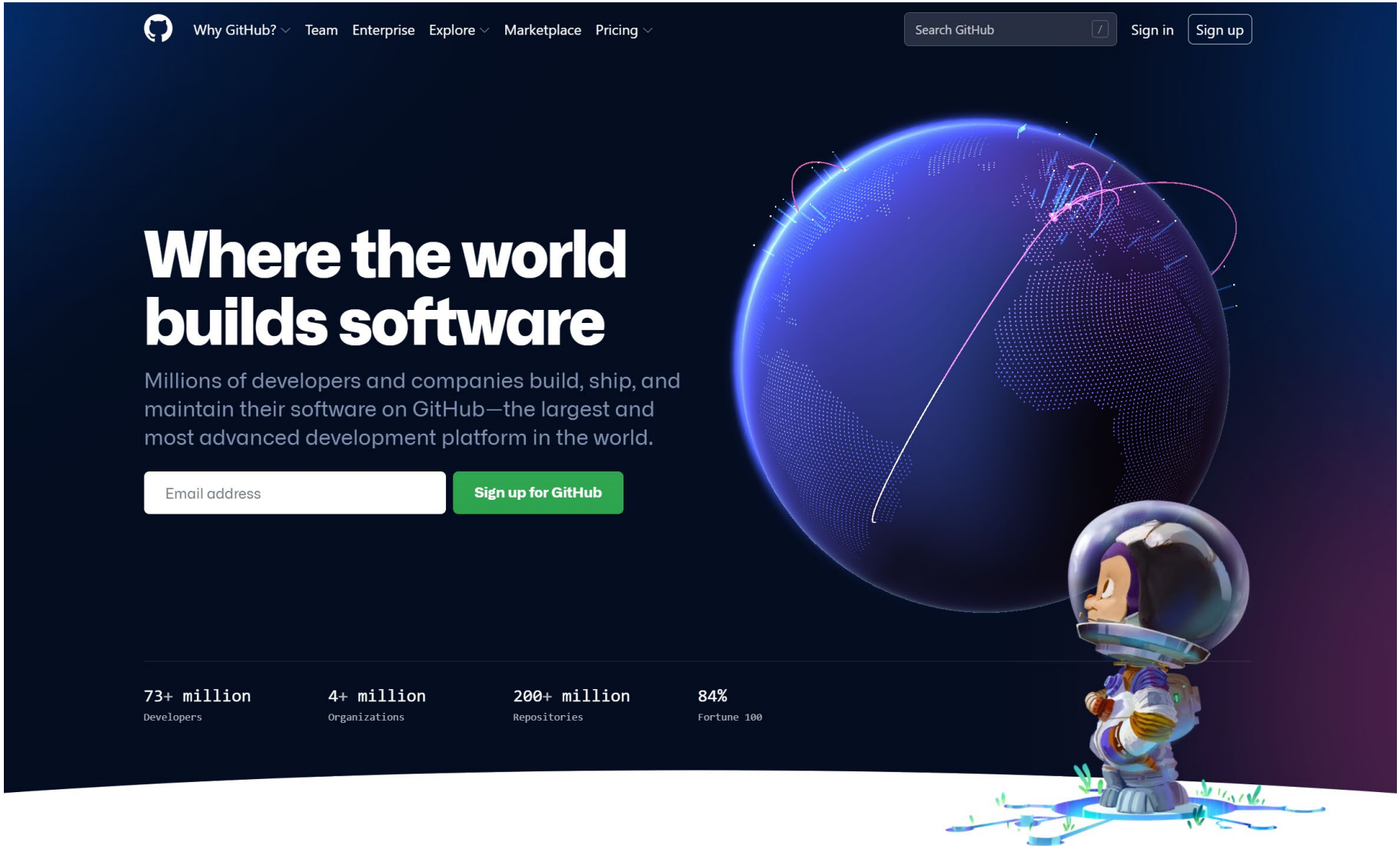
Desktop and server operating systems:

- Arch Linux
- Chromium OS
- Debian
- DragonflyBSD
- elementary OS
- Fedora
- FreeBSD
- Gentoo
- Kali Linux
- Linux Mint
- Manjaro
- NetBSD
- OpenBSD
- openSUSE
- Raspberry Pi OS (formerly Raspbian)
- ReactOS
- Red Hat Enterprise Linux
- Slackware
- TempleOS
- Ubuntu

Open Source Initiative keyhole symbol

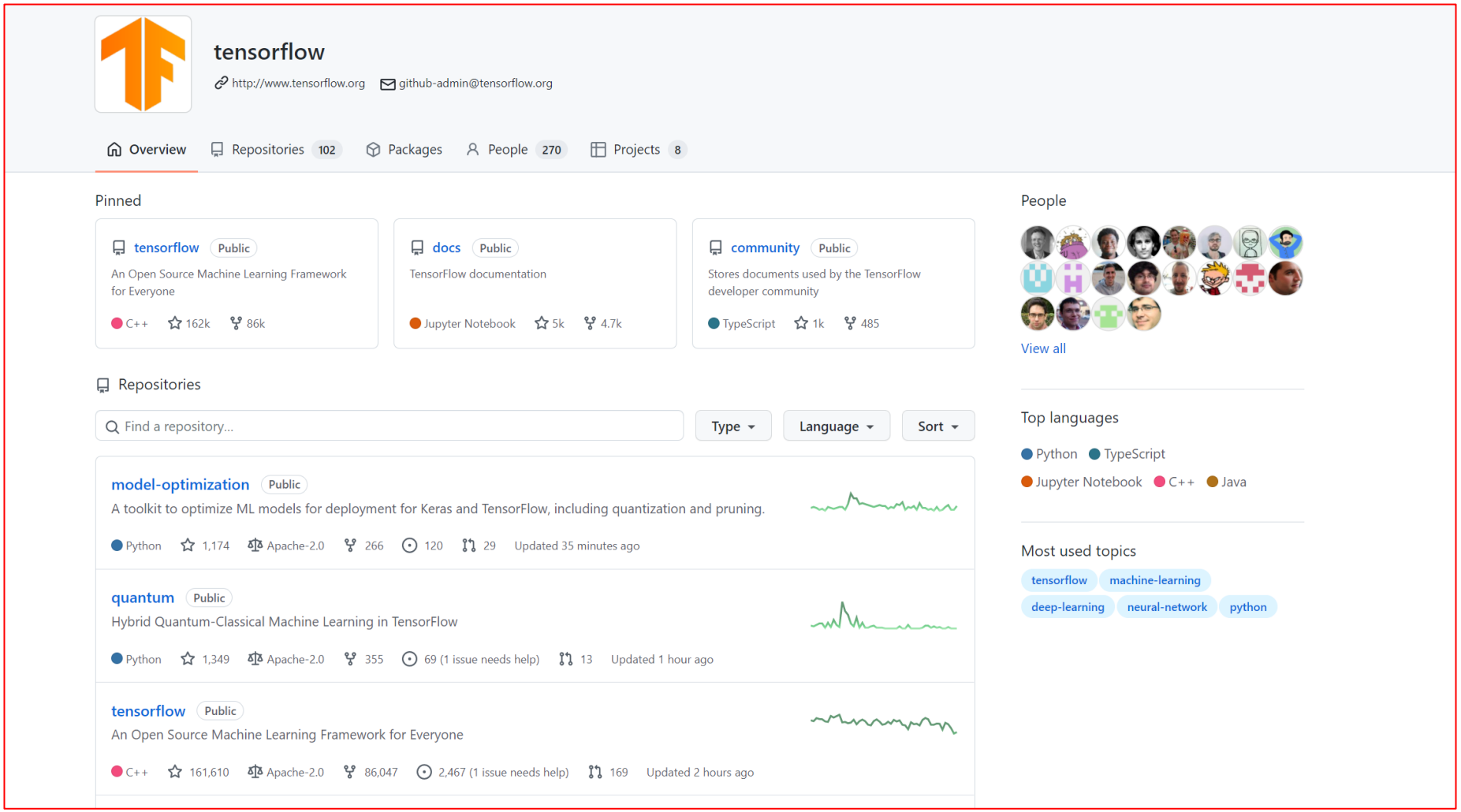
The "Keyhole Logo" combines the "O" of open and a keyhole, for unlocking source code (created by Colin Viebrock).

Github


Why GitHub?
Team
Enterprise
Explore
Marketplace
Pricing
Search GitHub
/
Sign in
Sign up
Where the world builds software
Millions of developers and companies build, ship, and maintain their software on GitHub—the largest and most advanced development platform in the world.
Email address
Sign up for GitHub
73+ million
Developers
4+ million
Organizations
200+ million
Repositories
84%
Fortune 100

Tensor Flow (Google)

The core open source library to help you develop and train ML models.
Get started quickly by running Colab notebooks directly in your browser.



https://github.com/tensorflow

RheoTool

https://github.com/fppimenta/rheoTool

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fppimenta / rheoTool Public

Notifications Fork 46 Star 78

Code Issues Pull requests Discussions Actions Projects Wiki Security Insights

master 1 branch 4 tags Go to file Code

fppimenta Fixed outdated link to Eigen in script downloadEigen 56c2701 on Sep 12, 2020 29 commits

doc	version 5	2 years ago
fe40	Fixed outdated link to Eigen in script downloadEigen	16 months ago
of60	Fixed outdated link to Eigen in script downloadEigen	16 months ago
of70	Fixed outdated link to Eigen in script downloadEigen	16 months ago
.gitignore	version 4.0	3 years ago
ChangeLog	version 5	2 years ago
LICENSE	Add LICENSE and ChangeLog	5 years ago
README.md	version 5	2 years ago

README.md

About

Toolbox to simulate GNF and viscoelastic fluid flows in OpenFOAM®

cfd viscoelastic openfoam finite-volume brownian-dynamics electrokinetics electroosmosis

Readme

GPL-3.0 License

78 stars

14 watching

46 forks

Releases 4

Version 4.1 Latest
on Apr 30, 2020

+ 3 releases

Packages

No packages published

Open Access (OA) publication

What is Open Access?

https://www.youtube.com/watch?v=gzRgknylTEM

[Traditional publishing without Open Access]

Copyright Transfer Agreement

The Asian Surgical Association ("the Proprietor") will be pleased to publish your article ("the Work"), tentatively entitled

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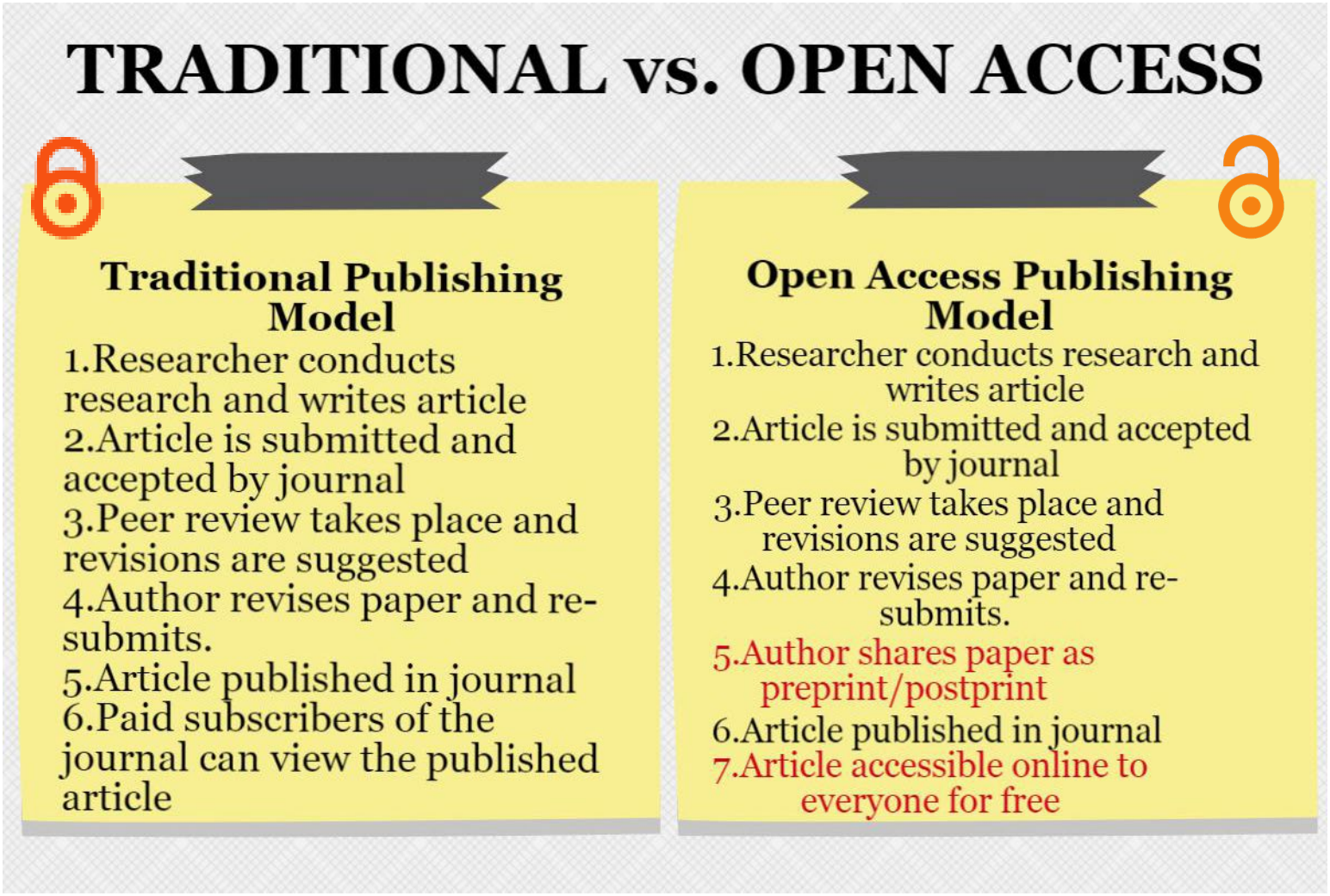
in the *Asian Journal of Surgery* ("the Journal") if the Work is accepted for publication. The undersigned authors transfer all copyright ownership in and relating to the Work, in all forms and media, to the Proprietor in the event that the Work is published. However, this agreement will be null and void if the Work is not published in the Journal.

The undersigned authors warrant that the Work is original, is not under consideration by another journal, and has not been previously published.

(This agreement must be signed by all authors. A photocopy of this form may be used if there are more than 10 authors.)

_____ _____

Author's name & signature Date Author's name & signature Date



Open access resources are those where the creator uses a licence (e.g. Creative Commons) allowing anyone to freely access their work.

https://www.enago.com/academy/an-introduction-to-open-access-publishing/

Open Access Practices

Green Open Access

- Allows an author to post a version of the paper in an institutional or subject repository (self-archival).
- This is not the final version which is accepted and published by the journal.
- It may be in pre-print form (paper before peer review) or post-print form (paper after peer review) or even the publisher's version of the paper after a defined embargo period. No APC involved.

Gold Open Access

- The author pays the journal a publication fee for making the article open access immediately upon publishing. This publication fee is also called as "Article Processing Charges (APC)."

Hybrid Open Access

- This is a mixed revenue model which includes subscription charges and publications fees.
- Some articles can be published as open access upon payment of APC by the author.
- Remaining articles are available only to paid subscribers of the journal.

Black Open Access

- This is a new form of open access that has emerged in recent years.
- Scholarly articles especially those behind paywalls are obtained illegally from academic social networks and pirate sites.
- Sharing of these articles do not adhere to journal copyright and sharing guidelines.
- This type of OA is also called as "Guerilla Open Access*".

* This term is taken from the book "Guerilla Open Access Manifesto" by Aaron Swartz

(Nov. 8, 1986 – Jan. 11, 2013)

Aaron Swartz:
Guerilla Open Access Manifesto

Guerilla Open Access Manifesto

Information is power. But like all power, there are those who want to keep it for themselves. The world's entire scientific and cultural heritage, published over centuries in books and journals, is increasingly being digitized and locked up by a handful of private corporations. Want to read the papers featuring the most famous results of the sciences? You'll need to send enormous amounts to publishers like Reed Elsevier.

There are those struggling to change this. The Open Access Movement has fought valiantly to ensure that scientists do not sign their copyrights away but instead ensure their work is published on the Internet, under terms that allow anyone to access it. But even under the best scenarios, their work will only apply to things published in the future. Everything up until now will have been lost.

That is too high a price to pay. Forcing academics to pay money to read the work of their colleagues? Scanning entire libraries but only allowing the folks at Google to read them? Providing scientific articles to those at elite universities in the First World, but not to children in the Global South? It's outrageous and unacceptable.

"I agree," many say, "but what can we do? The companies hold the copyrights, they make enormous amounts of money by charging for access, and it's perfectly legal — there's nothing we can do to stop them." But there is something we can, something that's already being done: we can fight back.

Those with access to these resources — students, librarians, scientists — you have been given a privilege. You get to feed at this banquet of knowledge while the rest of the world is locked out. But you need not — indeed, morally, you cannot — keep this privilege for yourselves. You have a duty to share it with the world. And you have: trading passwords with colleagues, filling download requests for friends.

Meanwhile, those who have been locked out are not standing idly by. You have been sneaking through holes and climbing over fences, liberating the information locked up by the publishers and sharing them with your friends.

But all of this action goes on in the dark, hidden underground. It's called stealing or piracy, as if sharing a wealth of knowledge were the moral equivalent of plundering a ship and murdering its crew. But sharing isn't immoral — it's a moral imperative. Only those blinded by greed would refuse to let a friend make a copy.

Large corporations, of course, are blinded by greed. The laws under which they operate require it — their shareholders would revolt at anything less. And the politicians they have bought off back them, passing laws giving them the exclusive power to decide who can make copies.

There is no justice in following unjust laws. It's time to come into the light and, in the grand tradition of civil disobedience, declare our opposition to this private theft of public culture.

We need to take information, wherever it is stored, make our copies and share them with the world. We need to take stuff that's out of copyright and add it to the archive. We need to buy secret databases and put them on the Web. We need to download scientific journals and upload them to file sharing networks. We need to fight for Guerilla Open Access.

With enough of us, around the world, we'll not just send a strong message opposing the privatization of knowledge — we'll make it a thing of the past. Will you join us?

Aaron Swartz
July 2008, Eremo, Italy

https://www.youtube.com/watch?v=IwJzgzVzYy8

Supporters of Swartz responded to news of his death with an effort called **#PDFTribute** to promote Open Access. On January 12, 2003, Eva Vivalt, a development economist at the World Bank, began posting her academic articles online using the hashtag *#pdftribute* as a tribute to Swartz.

Scholars posted links to their works. The story of Aaron Swartz has exposed the topic of open access to scientific publications to wider audiences.

In the wake of Aaron Swartz, many institutions and personalities have campaigned for open access to scientific knowledge. Swartz's death prompted calls for more open access to scholarly data (e.g., open science data).

In 2002, Swartz had stated that when he died, he wanted all the contents of his hard drives made publicly available.

Open Access Repositories

Collection of full-text documents available in online databases on the Internet that can be accessed freely and instantly (e.g. provided by universities).

Some of the most important **subject-specific repositories** are:

arXiv.org

arXiv, originally created at Los Alamos National Laboratory and now housed at Cornell University, It is actually a preprint server, acting as the original publisher for many physics papers which may later appear in peer-reviewed journals.

bioRxiv

bioRxiv is a free online archive and distribution service for unpublished preprints in the life sciences. By posting preprints on bioRxiv, authors are able to make their findings immediately available to the scientific community and receive feedback on draft manuscripts before they are submitted to journals.

Open Science Framework Preprint Repository

The Open Science Framework hosts repositories across disciplines. A new preprint revolution to facilitate open access to and community review of new research prior to publication.

PubMedCentral (PMC)

PMC is a free full-text archive of biomedical and life sciences journal literature at the U.S. National Institutes of Health's National Library of Medicine (NIH/NLM). PMC derives its importance as the mandated repository for articles based on research funded by the National Institutes of Health. Some journals automatically deposit all their content in PMC, others do so selectively at the request of NIH-funded authors.

RePEc (Research Papers in Economics)

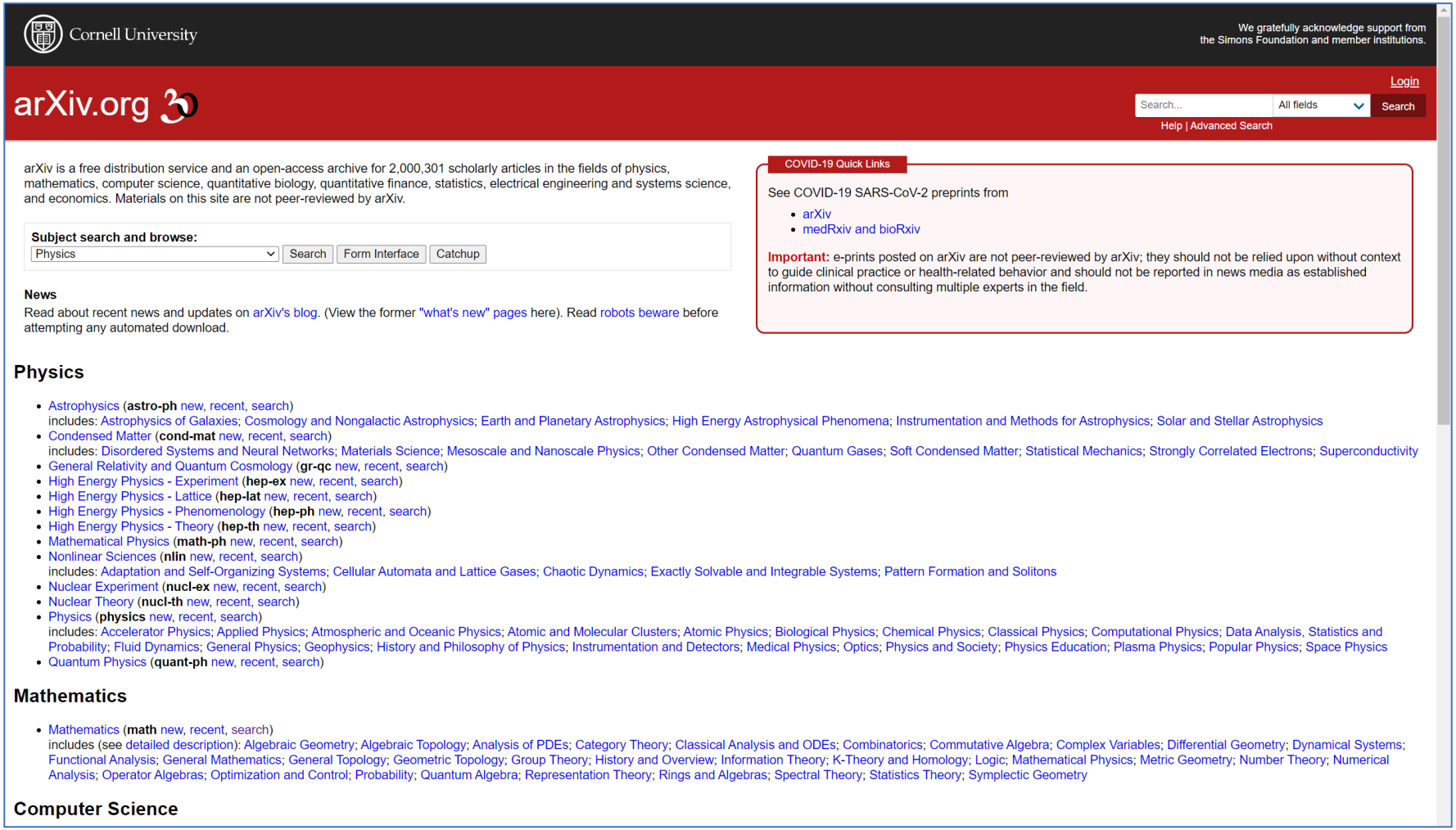
Social Science Research Network

(…)

https://www.library.ucsb.edu/scholarly-communication/open-access-repositories

arXiv

https://arxiv.org/



Cornell University

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arXiv.org

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arXiv is a free distribution service and an open-access archive for 2,000,301 scholarly articles in the fields of physics, mathematics, computer science, quantitative biology, quantitative finance, statistics, electrical engineering and systems science, and economics. Materials on this site are not peer-reviewed by arXiv.

Subject search and browse:

Physics Search Form Interface Catchup

News

Read about recent news and updates on arXiv's blog. (View the former "what's new" pages here). Read robots beware before attempting any automated download.

COVID-19 Quick Links

See COVID-19 SARS-CoV-2 preprints from

- arXiv
- medRxiv and bioRxiv

Important: e-prints posted on arXiv are not peer-reviewed by arXiv; they should not be relied upon without context to guide clinical practice or health-related behavior and should not be reported in news media as established information without consulting multiple experts in the field.

Physics

- Astrophysics (**astro-ph** new, recent, search)
  includes: Astrophysics of Galaxies; Cosmology and Nongalactic Astrophysics; Earth and Planetary Astrophysics; High Energy Astrophysical Phenomena; Instrumentation and Methods for Astrophysics; Solar and Stellar Astrophysics
- Condensed Matter (**cond-mat** new, recent, search)
  includes: Disordered Systems and Neural Networks; Materials Science; Mesoscale and Nanoscale Physics; Other Condensed Matter; Quantum Gases; Soft Condensed Matter; Statistical Mechanics; Strongly Correlated Electrons; Superconductivity
- General Relativity and Quantum Cosmology (**gr-qc** new, recent, search)
- High Energy Physics - Experiment (**hep-ex** new, recent, search)
- High Energy Physics - Lattice (**hep-lat** new, recent, search)
- High Energy Physics - Phenomenology (**hep-ph** new, recent, search)
- High Energy Physics - Theory (**hep-th** new, recent, search)
- Mathematical Physics (**math-ph** new, recent, search)
- Nonlinear Sciences (**nlin** new, recent, search)
  includes: Adaptation and Self-Organizing Systems; Cellular Automata and Lattice Gases; Chaotic Dynamics; Exactly Solvable and Integrable Systems; Pattern Formation and Solitons
- Nuclear Experiment (**nucl-ex** new, recent, search)
- Nuclear Theory (**nucl-th** new, recent, search)
- Physics (**physics** new, recent, search)
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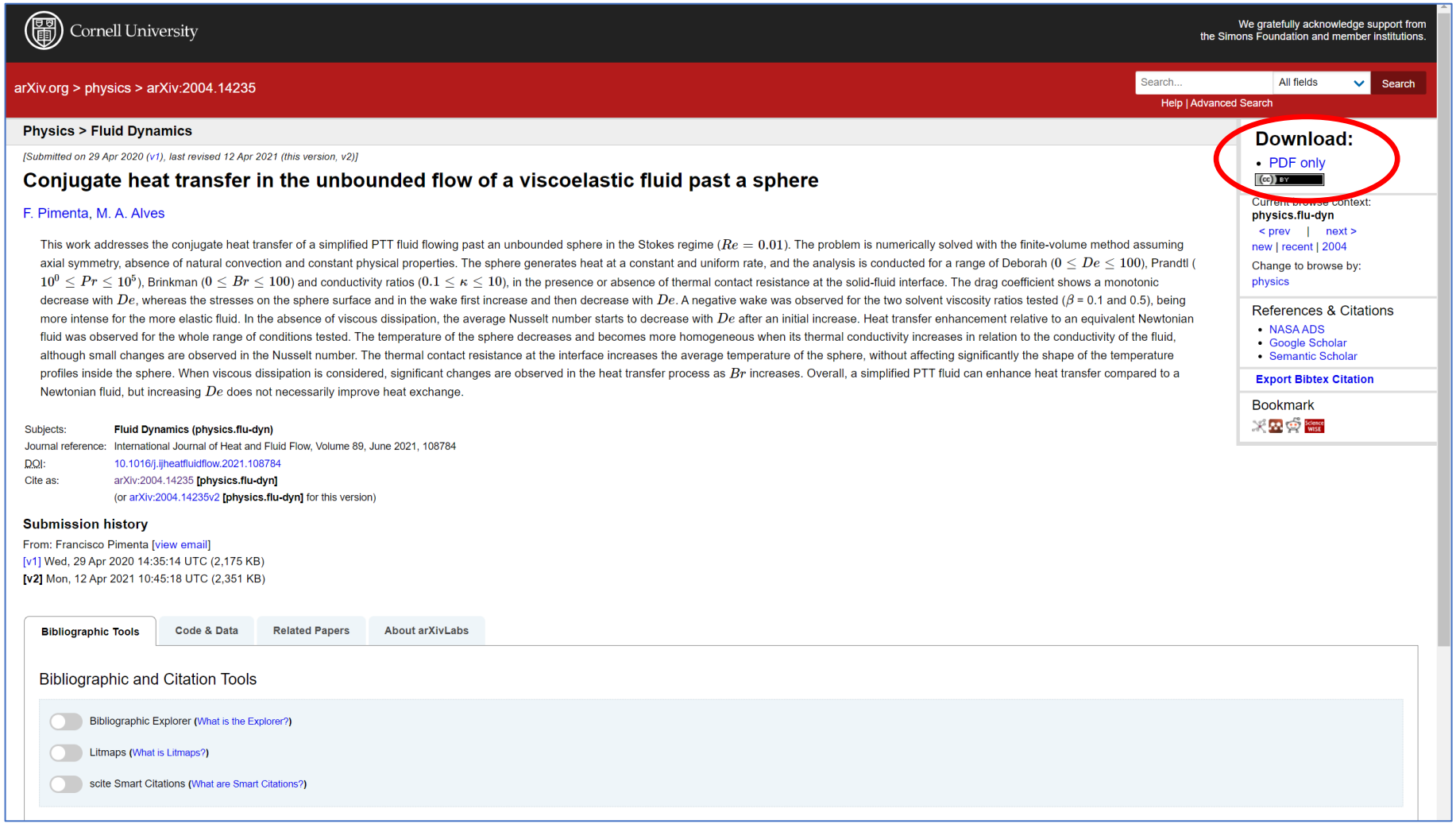

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[Submitted on 29 Apr 2020 (v1), last revised 12 Apr 2021 (this version, v2)]

Conjugate heat transfer in the unbounded flow of a viscoelastic fluid past a sphere

F. Pimenta, M. A. Alves

This work addresses the conjugate heat transfer of a simplified PTT fluid flowing past an unbounded sphere in the Stokes regime ($Re = 0.01$). The problem is numerically solved with the finite-volume method assuming axial symmetry, absence of natural convection and constant physical properties. The sphere generates heat at a constant and uniform rate, and the analysis is conducted for a range of Deborah ($0 \leq De \leq 100$), Prandtl ($10^0 \leq Pr \leq 10^5$), Brinkman ($0 \leq Br \leq 100$) and conductivity ratios ($0.1 \leq \kappa \leq 10$), in the presence or absence of thermal contact resistance at the solid-fluid interface. The drag coefficient shows a monotonic decrease with De, whereas the stresses on the sphere surface and in the wake first increase and then decrease with De. A negative wake was observed for the two solvent viscosity ratios tested (β = 0.1 and 0.5), being more intense for the more elastic fluid. In the absence of viscous dissipation, the average Nusselt number starts to decrease with De after an initial increase. Heat transfer enhancement relative to an equivalent Newtonian fluid was observed for the whole range of conditions tested. The temperature of the sphere decreases and becomes more homogeneous when its thermal conductivity increases in relation to the conductivity of the fluid, although small changes are observed in the Nusselt number. The thermal contact resistance at the interface increases the average temperature of the sphere, without affecting significantly the shape of the temperature profiles inside the sphere. When viscous dissipation is considered, significant changes are observed in the heat transfer process as Br increases. Overall, a simplified PTT fluid can enhance heat transfer compared to a Newtonian fluid, but increasing De does not necessarily improve heat exchange.

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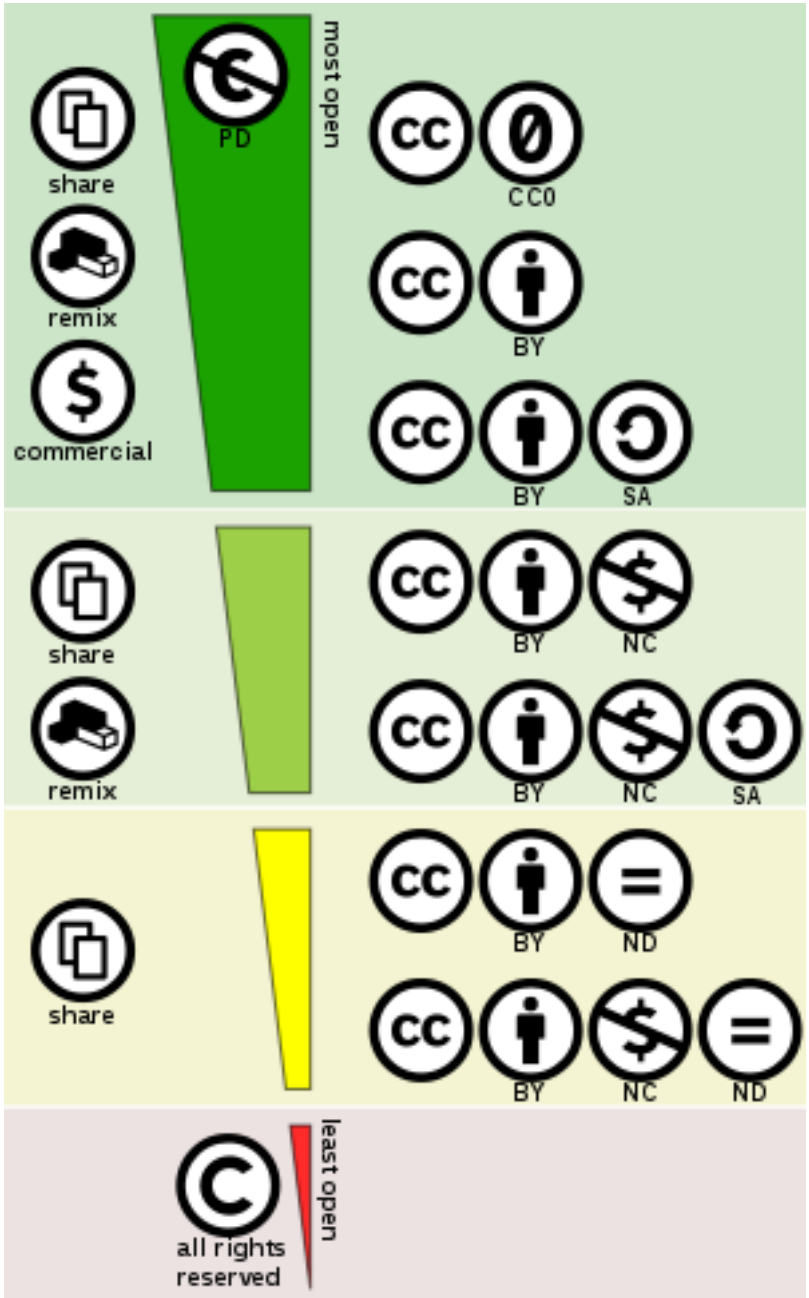

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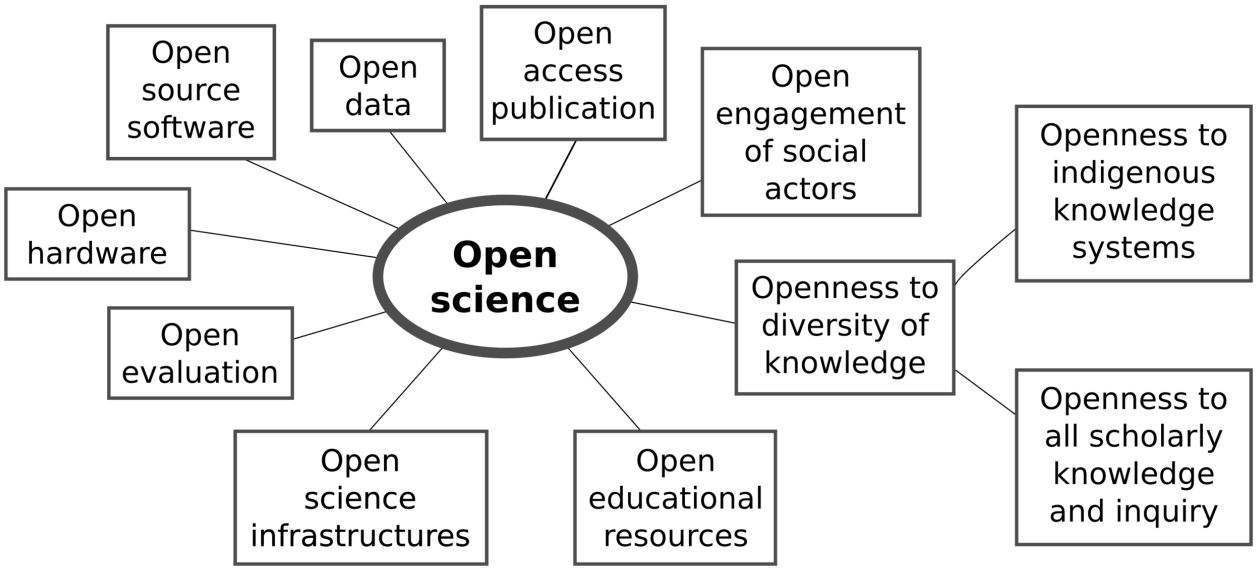

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