

# O ecossistema de Ciência Aberta – compartilhando universos em mini, macro, mega e exa-escalas

Claudia Bauzer Medeiros  
Instituto de Computação – Unicamp



# Agradecimentos

- Rodrigo Bonfleur



Thursday, September 9th, 2021 2pm - BRT [WATCH WEBINAR](#)

**O ecossistema de Ciência Aberta – compartilhando universos em mini, macro, mega e exa escalas.**



*Claudia Bauzer Medeiros*  
Unicamp

A "Ciência aberta" é um movimento mundial cujo principal objetivo é permitir que pesquisadores em qualquer lugar do mundo possam colaborar por meio do compartilhamento dos seus resultados de pesquisa - como por exemplo dados, software, modelos ou publicações. Os principais valores associados são inclusão, transparência, e pesquisa confiável e reprodutível. A astronomia é uma das áreas em que este movimento se destaca, pela ampla publicação de catálogos, pelo compartilhamento de dispositivos e software, e pelas publicações envolvendo uma grande quantidade de pesquisadores do mundo inteiro. O que falta fazer? Como outras áreas do conhecimento vêm tratando do assunto? Práticas de

@Claudia Bauzer Medeiros



## POINT OF VIEW

# How open science helps researchers succeed

**Abstract** Open access, open data, open source and other open scholarship practices are growing in popularity and necessity. However, widespread adoption of these practices has not yet been achieved. One reason is that researchers are uncertain about how sharing their work will affect their careers. We review literature demonstrating that open research is associated with increases in citations, media attention, potential collaborators, job opportunities and funding opportunities. These findings are evidence that open research practices bring significant benefits to researchers relative to more traditional closed practices.

DOI: [10.7554/eLife.16800.001](https://doi.org/10.7554/eLife.16800.001)

**ERIN C MCKIERNAN\***, PHILIP E BOURNE, C TITUS BROWN, STUART BUCK, AMYE KENALL, JENNIFER LIN, DAMON MCDUGALL, BRIAN A NOSEK, KARTHIK RAM, COURTNEY K SODERBERG, JEFFREY R SPIES, KAITLIN THANAY, ANDREW UPDEGROVE, KARA H WOO AND TAL YARKONI

# Outline

- Ciência aberta
  - O que, para quem, porque, como
  
- Desafios em todas as escalas

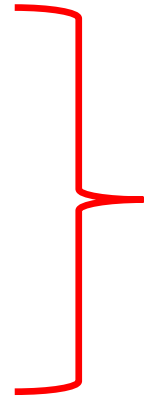
# Outline

- Ciência aberta
  - O que, para quem, porque, como
- Desafios em ~~todas as escalas~~ todos domínios

# Palavras-chave

- Ciência
- Abertura da ciência

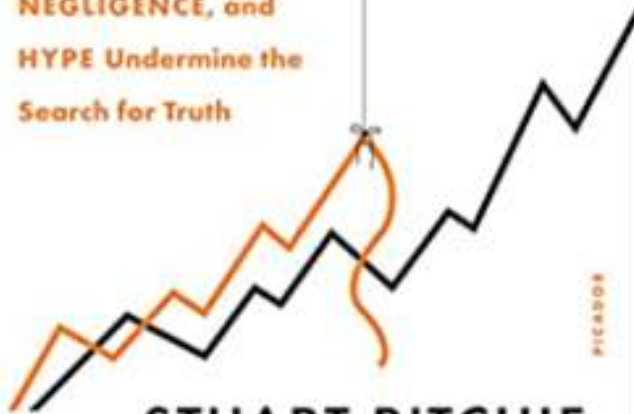
- Reprodutibilidade
- Compartilhamento
- Reuso



PARA O AVANÇO DA CIÊNCIA

# Science Fictions

How FRAUD, BIAS,  
NEGLIGENCE, and  
HYPE Undermine the  
Search for Truth



STUART RITCHIE

THE NEW YORK TIMES BESTSELLER

# everybody lies

What the Internet  
Can Tell Us About  
Who We Really Are

'A whirlwind tour of the human psyche' *Economist*

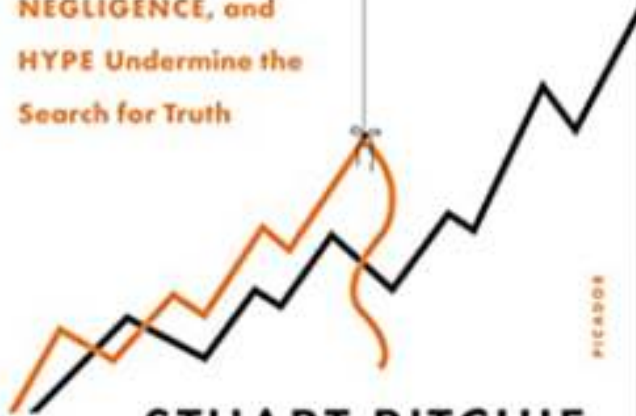


Seth Stephens-Davidowitz

Foreword by Steven Pinker ALGONQUIN

# Science Fictions

How FRAUD, BIAS, NEGLIGENCE, and HYPE Undermine the Search for Truth



STUART RITCHIE

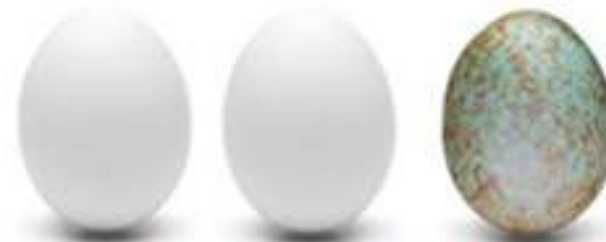
REPRODUTIBILIDADE

THE NEW YORK TIMES BESTSELLER

# everybody lies

What the Internet Can Tell Us About Who We Really Are

'A whirlwind tour of the human psyche' *Economist*



Seth Stephens-Davidowitz

Foreword by Steven Pinker

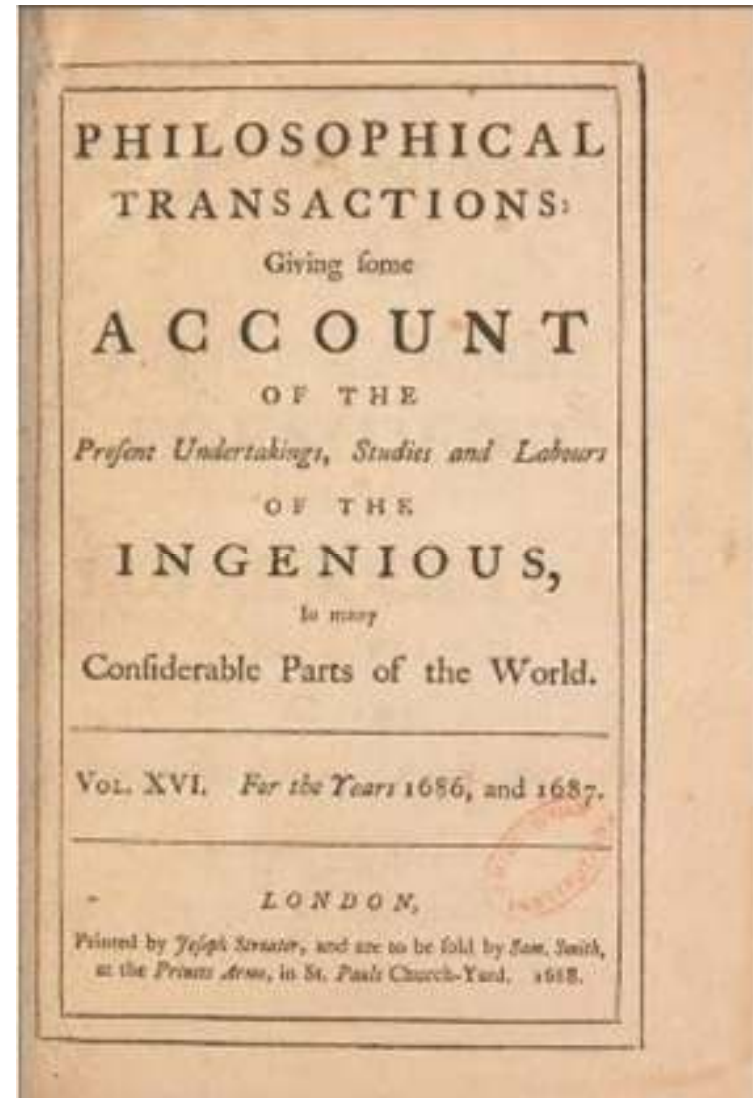
BUSCAS NA WEB





Henry Oldenburg by Jan van Cleve (III), 1668

(@Wikipedia)



<https://archive.org/details/Philosophicaltr16Roya/page/n5/mode/2up>

@Claudia Bauzer Medeiros

so much heavier, than the Air of the former place was, when the *Mercury* stood at 29½ inches.

But in making such comparisons, we must not forget to consider the Situation of the several places, if we mean to make Estimates not only of the weight of the Atmosphere, but of the weight and density of the Air. For, though the Scales will shew (as has been said) whether there be a difference of weight in the Atmosphere at the two places; yet, if one of them be in a Vale or bottom, and the other on the top or some elevated part of a Hill, it is not to be expected, that the Atmosphere, in this latter place, should gravitate as much, as the Atmosphere in the former, on which a longer Pillar of Air does lean or weigh.

And the mention, I have made of the differing Situation of Places, puts me in mind of something, that may prove another use of our *Statical Baroscope*, and which I had thoughts of making tryal off, but was accidentally hindered from the opportunity of doing it. Namely, that by exactly poyling the Bable at the foot of a high Steeple or Hill, and carrying it in its close Frame to the top, one may, by the weight requisite to be added to Counterpoise there to bring the Beam to its Horizontal position, observe the difference of the weight of the Air at the bottom, and at the top; and, in case the Hill be high enough, at some intermediate Stations. But how far this may assist men, to estimate the *Absolute or Comparative* height of Mountains, and other elevated Places; and what other Uses the Instrument may be put to, when it is duly improved; and the Cautions, that may be requisite in the several cases, that shall be proposed, I must leave to more leisure, and farther Consideration.

#### *The Particulars.*

*Of those Observations of the Planet Mars, formerly intimated to have been made at London in the Months of February and March A. 1666.*

To perform, what was promised *Num. 11.* of these Papers, *pag. 198*: 'tis thought fit now to publish the Particular Observations, concerning the spots in *Mars*, and their motion, as they were made with a 36 foot Telescope, and produced in

K k writing

writing before the *Royal Society*, the 28 *March 1666.* by Mr. *Hook*, as follows:

Having a great desire (saith he) to observe the *Body of Mars*, whilst *Acronycal* and *Retrograde* (having formerly with a Glass of about 12. foot long, observ'd some kind of Spots in the Face of it,) though it be not at present in the *Perihelium* of its Orbe, but nearer its *Aphelium*, yet I found, that the Face of it, when near its Opposition to the Sun (with a Charge, the 36. foot-glass, I made use off, would well bear) appear'd very near as big, as that of the Moon to the *naked eye*; which I found, by comparing it with the Full Moon, near adjoining to it, *March 10.*

But such had been the ill disposition of the Air for several nights, that from more than 20. Observations of it, which I had made since its being *Retrograde*, I could find nothing of satisfaction, though I often imagin'd, I saw Spots, yet the *Inflexive veins* of the Air (if I may so call those parts, which, being interspers'd up and down in it, have a greater or less Refractive power, than the Air next adjoining, with which they are mixt) did make it so confus'd and glaring, that I could not conclude upon any thing.

On the third of *March*, though the Air were still bad enough yet I could see now and then the *Body of Mars* appearing of the form A: which I presently described by a *Scheme*; and about 10. minutes after, as exactly representing what I saw through the Glass, as I could, I drew the *Scheme B.* This I was sufficiently satisfied (by very often observing it through the Tube, and changing my Eye into various positions, that so there might be no kind of Fallacy in it) could be nothing else, but some more *Dusky* and *Spotted* parts of the Face of this Planet.

*March 10.* finding the Air very bad, I made use of a very shallow Eye-glass, as finding nothing *Distinct* with the greater *Charge*; and saw the appearance of it as in C, which I imagin'd, might be the Representation of the former Spots by a lesser charge. About 3 of the Clock the same morning, the Air being very bad (though to appearance exceeding clear, and causing all the Stars to twinkle, and the minute Stars to appear very thick) the *Body* seem'd like D; which I still suppos'd to be the

Observações Marte Fevereiro/Março 1665 == data, hora, instrument, contexto  
<https://archive.org/details/jstor-101500/mode/2up>

# **OPEN SCIENCE – O QUE É?**

@Claudia Bauzer Medeiros

The National Academies of  
SCIENCES • ENGINEERING • MEDICINE

**CONSENSUS STUDY REPORT**

**OPEN SCIENCE BY DESIGN**

Realizing a Vision for 21st Century Research



**National Academies of Sciences,  
Engineering, Medicine**

**July 2018**

**Open science =**

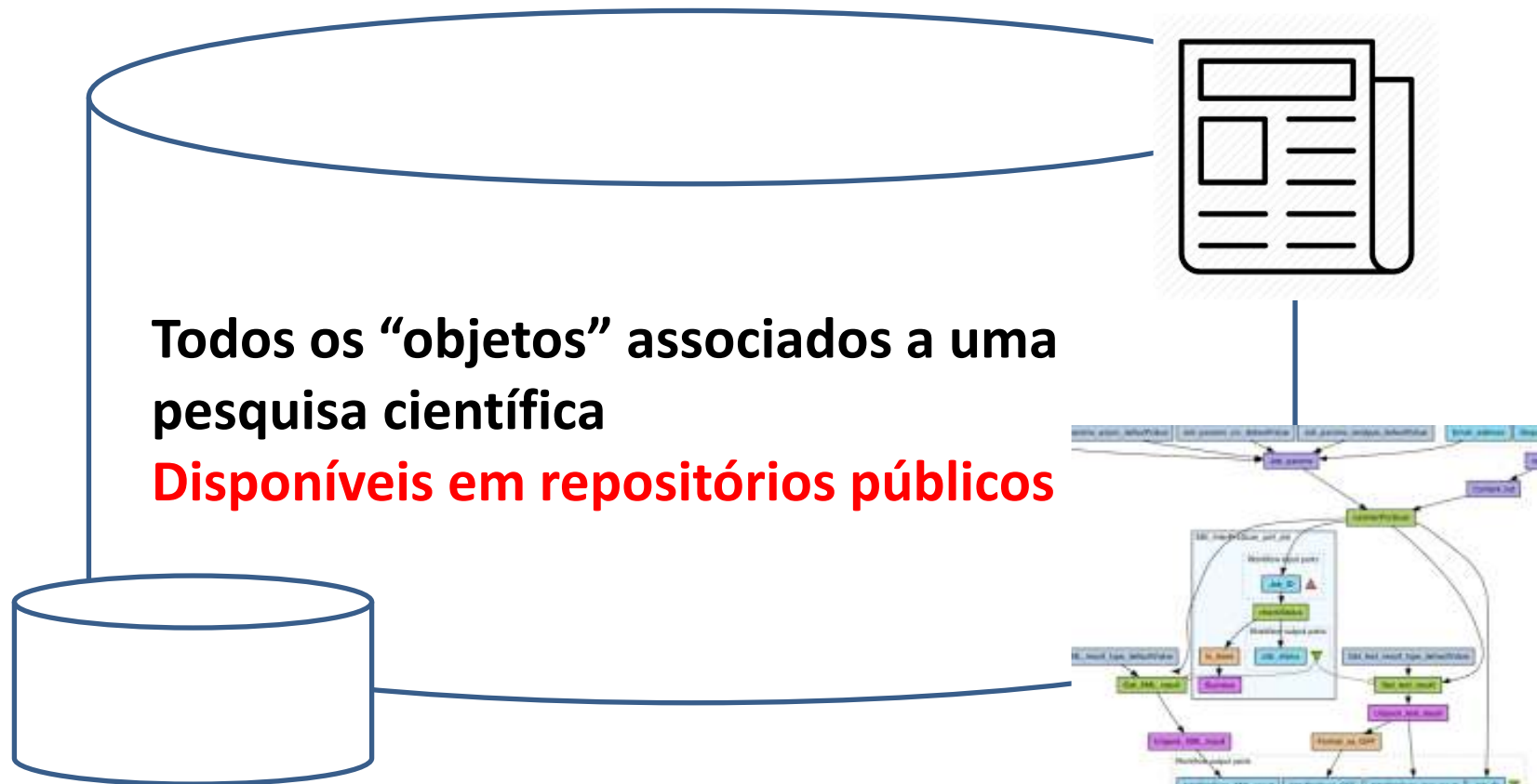
**Open access = papers**

**Open data**

**Open methods = open source**

@ Claudia Bauzer Medeiros

# Ciencia Aberta

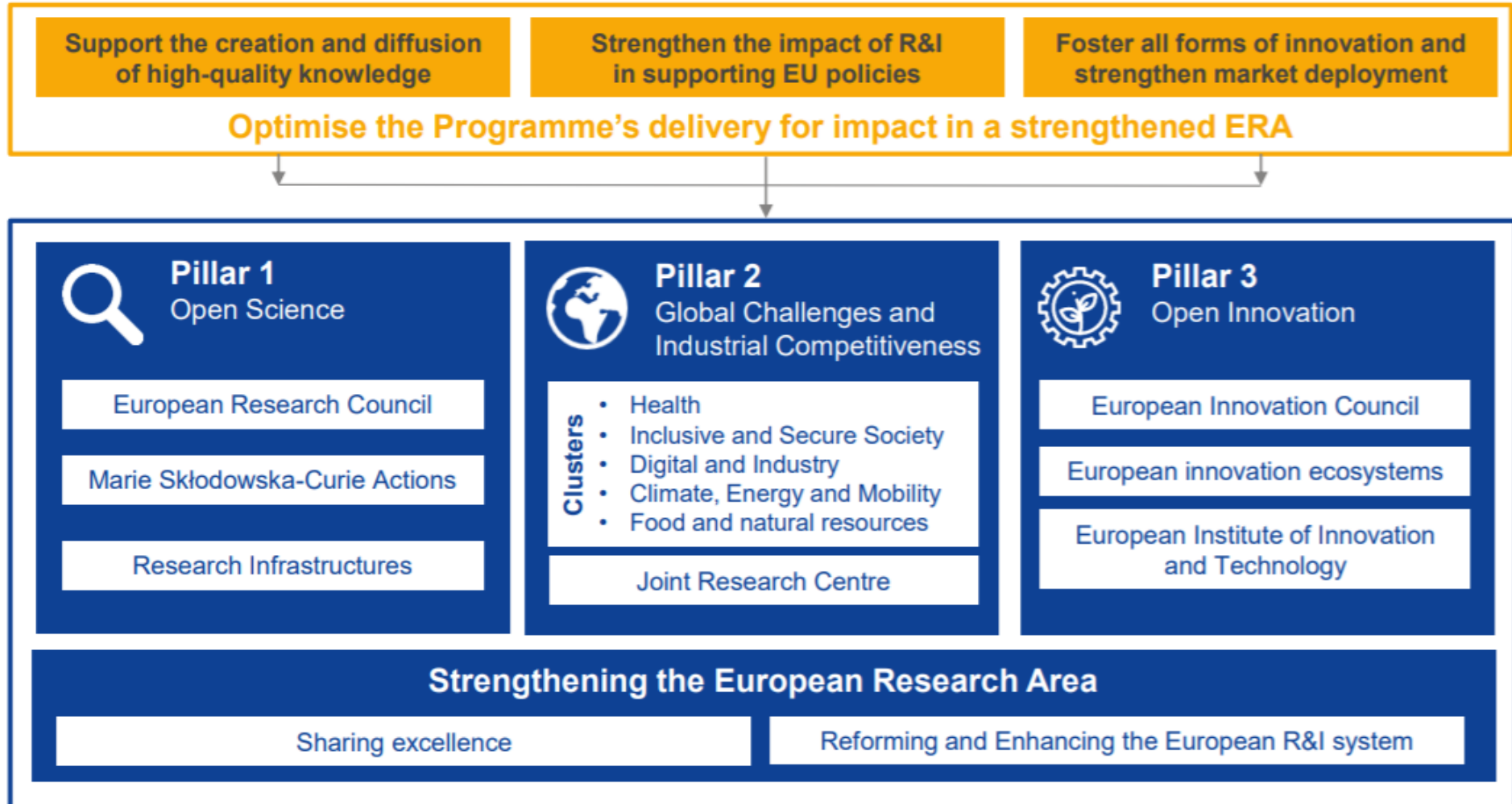


# **OPEN SCIENCE – PARA QUE???**

@Claudia Bauzer Medeiros

# Horizon Europe: evolution not revolution

## Specific objectives of the Programme





United Nations  
Educational, Scientific and  
Cultural Organization

Organisation  
des Nations Unies  
pour l'éducation,  
la science et la culture

Organización  
de las Naciones Unidas  
para la Educación,  
la Ciencia y la Cultura

Организация  
Объединенных Наций по  
вопросам образования,  
науки и культуры

منظمة الأمم المتحدة  
للتربية والعلم والثقافة

联合国教育、  
科学及文化组织

**INTERGOVERNMENTAL MEETING OF EXPERTS (CATEGORY II)  
RELATED TO A DRAFT UNESCO RECOMMENDATION ON OPEN SCIENCE**

*Online, 6-7 and 10-12 May 2021*

**DRAFT TEXT OF THE UNESCO RECOMMENDATION  
ON OPEN SCIENCE**

**PROVISIONALLY ADOPTED  
(AS OF 11 MAY 2021)**

@ClaudiaBauzerVieira



# Unesco

*Noting* that the global COVID-19 health crisis has proven worldwide the urgency of and need for fostering an equitable access to scientific information, facilitating the sharing of scientific knowledge, data and information, enhancing scientific collaboration and science- and knowledge-based decision making to respond to global emergencies and increase the resilience of societies,

# Unesco

*Noting* that the global COVID-19 health crisis has proven worldwide the urgency of and need for fostering an equitable access to scientific information, facilitating the sharing of scientific knowledge, data and information, enhancing scientific collaboration and science- and knowledge-based decision making to respond to global emergencies and increase the resilience of societies,

# Unesco

*Noting* that the global COVID-19 health crisis has proven worldwide the urgency of and need for fostering an equitable access to scientific information, facilitating the sharing of scientific knowledge, data and information, enhancing scientific collaboration and science- and knowledge-based decision making to respond to global emergencies and increase the resilience of societies,

# Unesco

(e) Federated information technology infrastructure for Open Science, including high performance computing, cloud computing and data storage where needed, and robust, open and community managed infrastructures, protocols and standards to support biodiversity and

initiatives need to call on advanced data science skills including analysis, statistics, machine learning, artificial intelligence, visualization and the ability to write code and use algorithms with scientific and ethical responsibility.

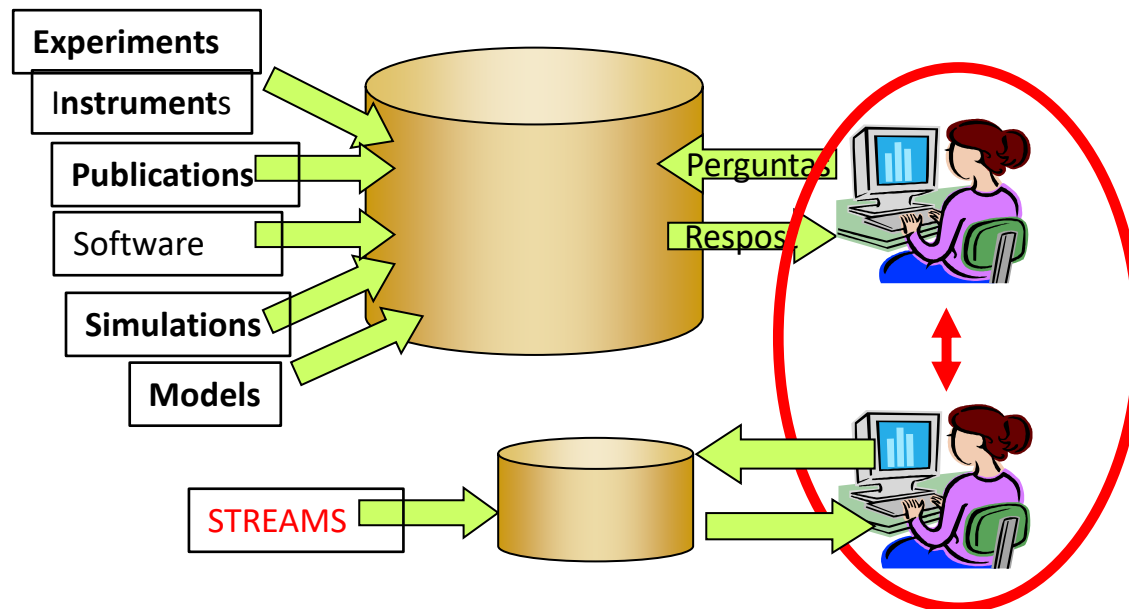
# Unesco

- **(iv) Investing in human resources, training, education, digital literacy and capacity building for Open Science**
- 20. Open Science requires investment in capacity building and human capital. Transforming scientific practice to adapt to the changes, challenges, opportunities and risks of the 21st century digital era, requires targeted research, education and training in the skills required for new technologies and in the ethos and practices of Open Science. Member States are encouraged to consider the following:
  - (a) Providing systematic and continuous capacity building on Open Science concepts and practices, including broad comprehension of the Open Science guiding principles and core values as well as technical skills and capacities in digital literacy, digital collaboration practices, data science and stewardship, **curation, long-term preservation and archiving**, information and data literacy, web safety, content ownership and sharing, as well as software engineering and computer science.

**ABERTURA – REPRODUTIBILIDADE,  
AUDITORIA, ECONOMIA DE RECURSOS  
E TEMPO**

**CIÊNCIA ABERTA = COLABORAÇÃO E  
COMPARTILHAMENTO**

# Ciência aberta = colaboração pelo compartilhamento de resultados de pesquisa





# Dados digitais abertos?

- Qualquer pessoa **E SISTEMAS** podem
  - Descobrir se os dados existem
  - Descobrir como (e se) obtê-los
  - Compartilhar “tudo”? Não necessariamente
  - **METADADOS ABERTOS**

Restrições = segurança, confidencialidade, ética, propriedade intelectual

# **OPEN SCIENCE – METADADOS ABERTOS**

# OPEN SCIENCE

**Metadados de artigos**  
**Metadados de software**  
**Metadados de dados**  
**Metadados de qq coisa associada a resultados de pesquisa**

FILES FILES FILES FILES FILES

...

FILES FILES FILES FILES FILES

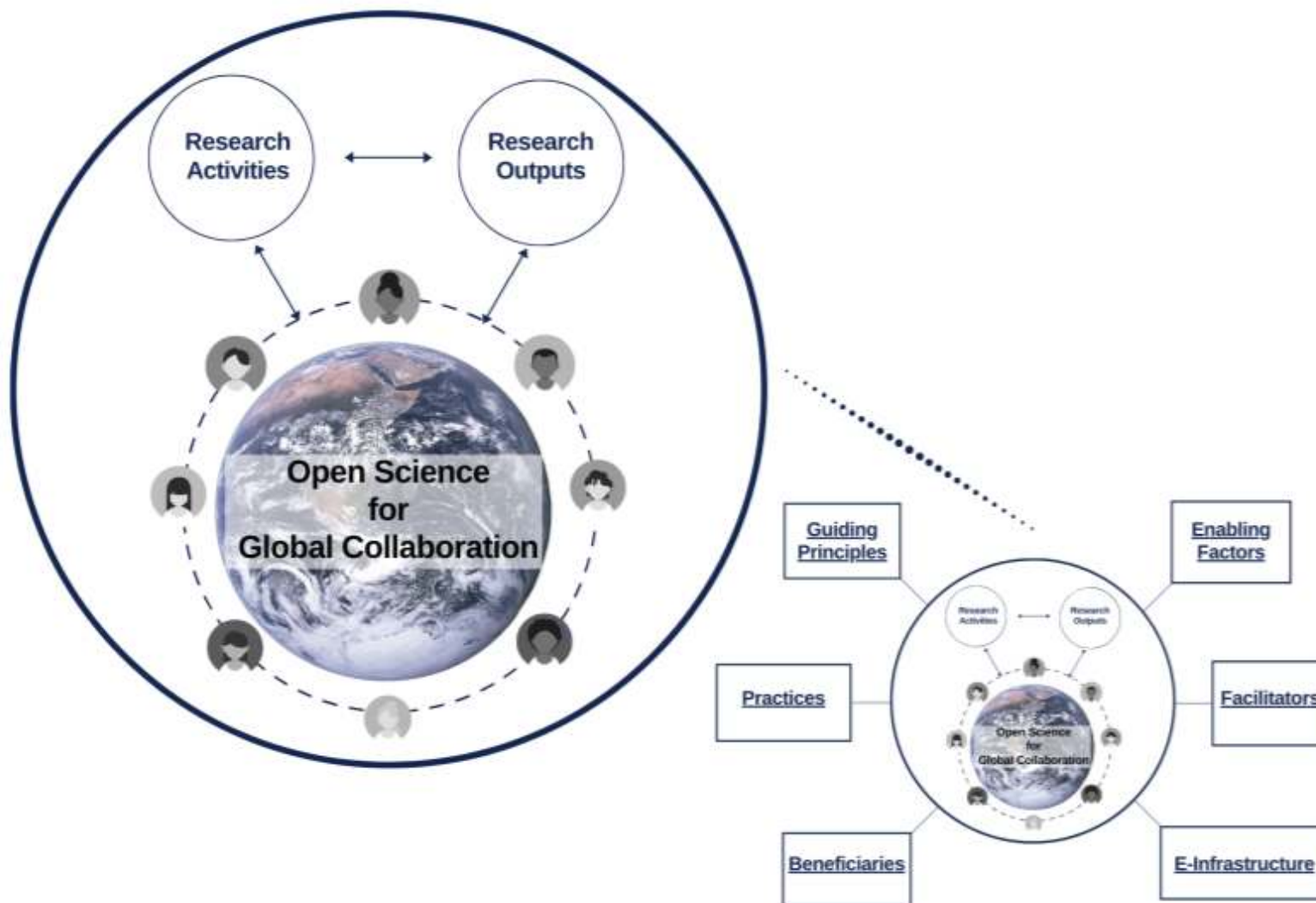
# **DESAFIOS EM QUALQUER ESCALA TECNOLÓGICOS E HUMANOS**

@Claudia Bauzer Medeiros

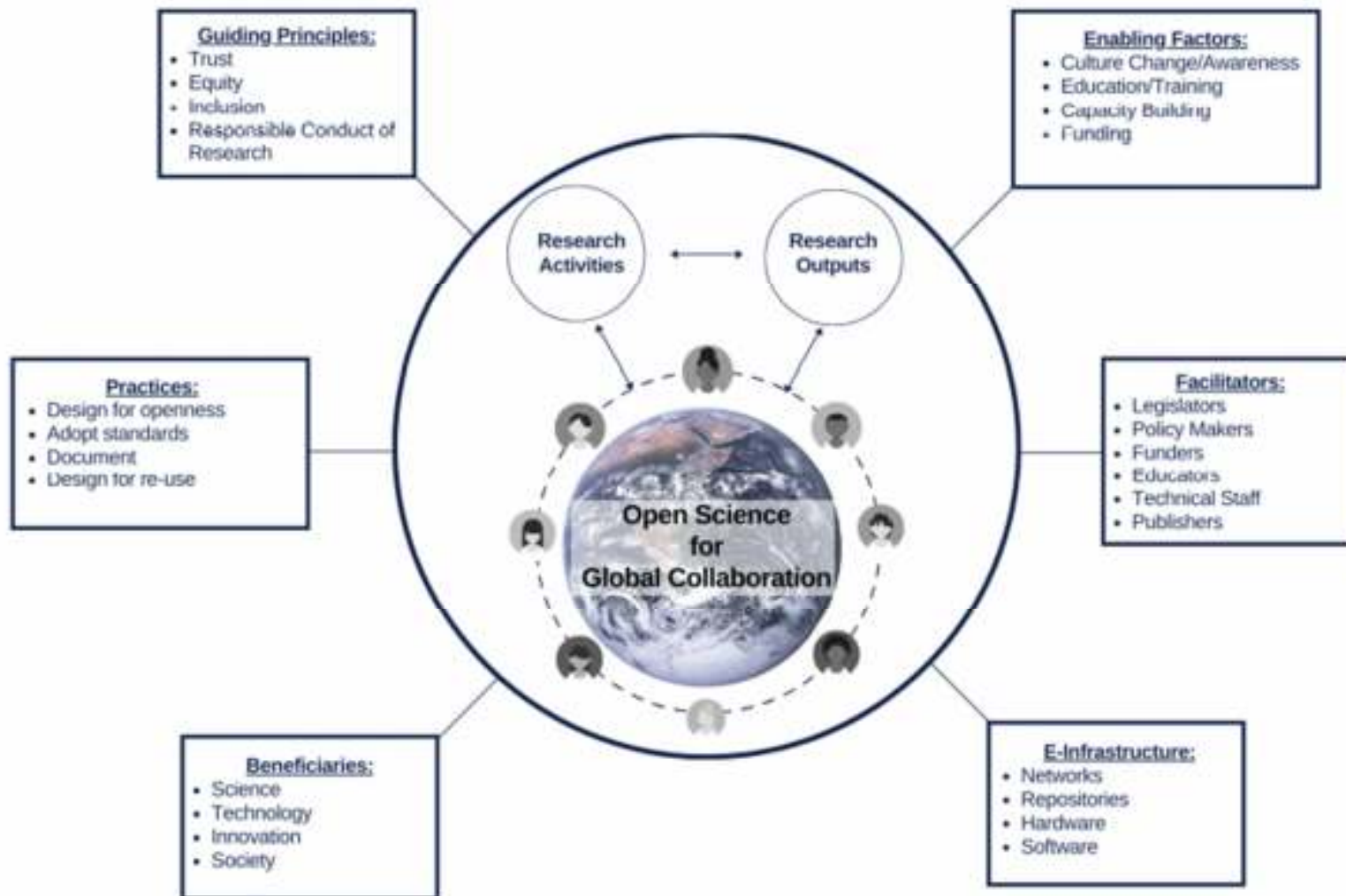


**IAP input into the UNESCO  
Open Science  
Recommendation**

**Submitted to UNESCO 16 June 2020**



[https://www.interacademies.org/sites/default/files/2020-07/Open\\_Science\\_0.pdf](https://www.interacademies.org/sites/default/files/2020-07/Open_Science_0.pdf)



# Desafios – compartilhamento para reuso

- E-Infrastructure
- **Open by design**
  - pessoas (treinamento, educação, mudança cultural)
  - Software, ciclos de vida dos dados
- Proteção, segurança
- Confiança



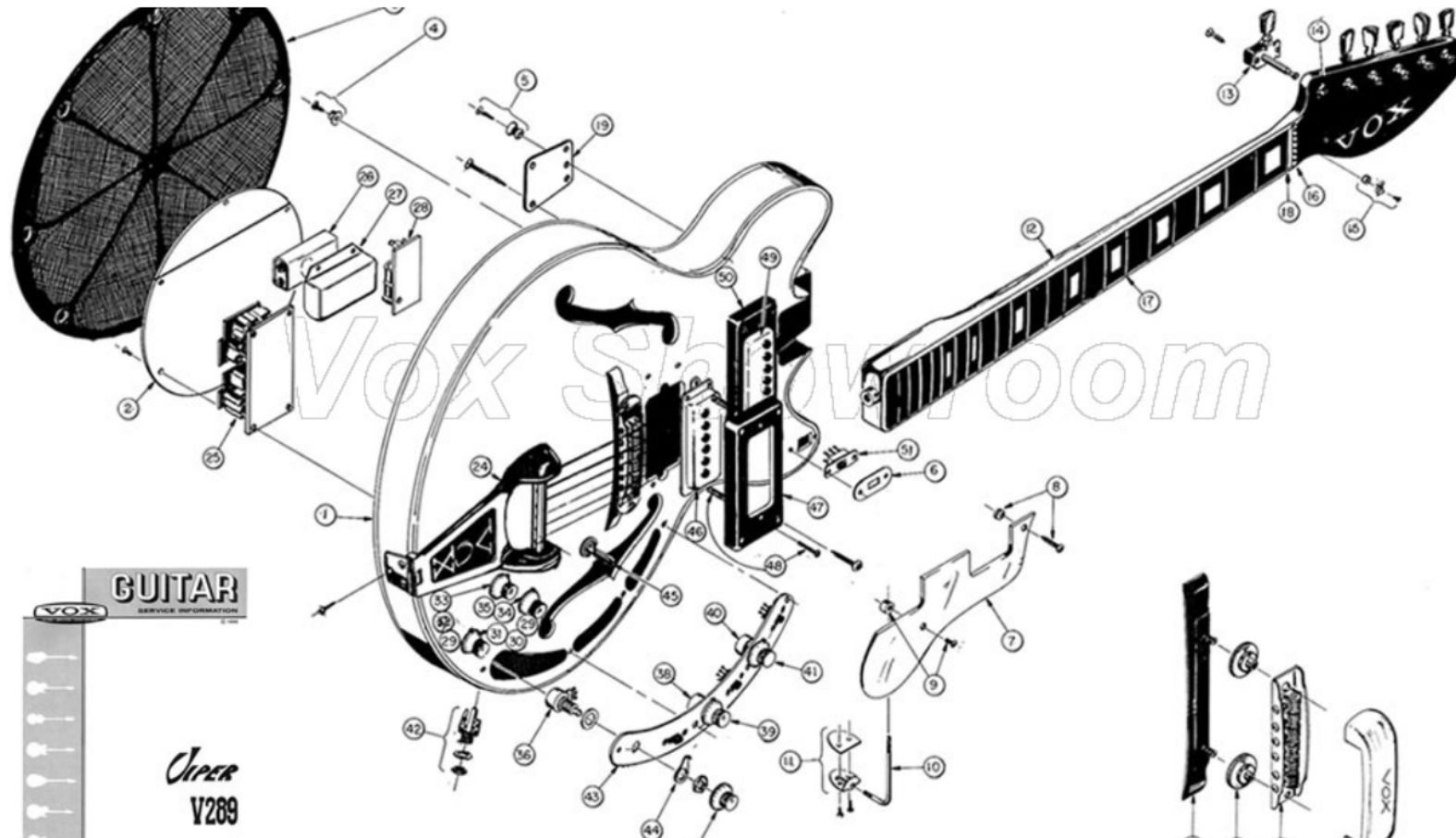
# Desafios em todas as escalas

- Padrão de metadados?
- Identificação única?
- Versionamento
- Proveniência
- Controle de acesso

# Desafios - heterogeneidade

Dados astronômicos abertos

# Compartilhamento e reuso



<http://www.voxshowroom.com/us/guitar/viper1.html>

Thanks to Lance Waller

# Compartilhamento e reuso



Collage – Pablo Picasso –

<https://es-es.facebook.com/280698011956458/posts/natureza-morta-com-cadeira-de-palha-1912-colagem-de-pablo-picasso-museu-picasso-/1797343096958601/>

# Desafios –cybersecurity, cyber resilience

August 5, 2021

## [NIST Updates Cyber Resiliency Guide to Account for Increasingly Sophisticated Threats](#)

// **Brandi Vincent**

In a draft update to its flagship cyber resiliency publication released Thursday, experts from the National Institute of Standards and Technology offer a next-gen strategy for protecting critical information technology systems from their inside out.

**[Read full article »](#)**

# **CIÈNCIA ABERTA E BOAS PRÁTICAS CIENTÍFICAS**

**PUBLICAÇÃO DE DADOS AUMENTA  
CITAÇÕES**

[Submitted on 4 Jul 2019 (v1), last revised 5 Mar 2020 (this version, v3)]

## The citation advantage of linking publications to research data

[Giovanni Colavizza](#), [Iain Hrynaszkiewicz](#), [Isla Staden](#), [Kirstie Whitaker](#), [Barbara McGillivray](#)

Efforts to make research results open and reproducible are increasingly reflected by journal policies encouraging or mandating authors to provide data availability statements. As a consequence of this, there has been a strong uptake of data availability statements in recent literature. Nevertheless, it is still unclear what proportion of these statements actually contain well-formed links to data, for example via a URL or permanent identifier, and if there is an added value in providing such links. We consider 531,889 journal articles published by PLOS and BMC, develop an automatic system for labelling their data availability statements according to four categories based on their content and the type of data availability they display, and finally analyze the citation advantage of different statement categories via regression. We find that, following mandated publisher policies, data availability statements become very common. In 2018 93.7% of 21,793 PLOS articles and 88.2% of 31,956 BMC articles had data availability statements. Data availability statements containing a link to data in a repository -- rather than being available on request or included as supporting information files -- are a fraction of the total. In 2017 and 2018, 20.8% of PLOS publications and 12.2% of BMC publications provided DAS containing a link to data in a repository. We also find an association between articles that include statements that link to data in a repository and up to 25.36% ( $\pm 1.07\%$ ) higher citation impact on average, using a citation prediction model. We discuss the potential implications of these results for authors (researchers) and journal publishers who make the effort of sharing their data in repositories. All our data and code are made available in order to reproduce and extend our results.



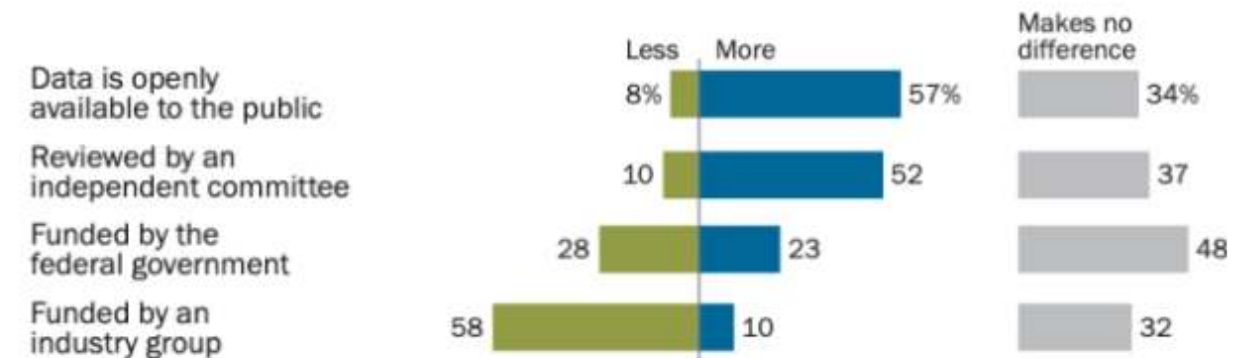
**PUBLICAÇÃO DE DADOS COMBATE  
FAKE NEWS**

**8** What boosts public trust in scientific research findings? Most say it's making data openly available. A 57% majority of Americans say they trust scientific research findings more when the data is openly available to the public. And about half of the U.S. public (52%) say they are more likely to trust research that has been independently reviewed.

---

## Majority of Americans say they are more apt to trust research when the data is openly available

*% of U.S. adults who say when they hear each of the following, they trust scientific research findings ...*



Note: Respondents who did not give an answer are not shown.

Source: Survey conducted Jan. 7-21, 2019.

"Trust and Mistrust in Americans' Views of Scientific Experts"

**PEW RESEARCH CENTER**

---

<https://www.pewresearch.org/fact-tank/2020/02/12/key-findings-about-americans-confidence-in-science-and-their-views-on-scientists-role-in-society/>

**PUBLICAÇÃO DE DADOS ACELERA  
DESCOBERTAS CIENTÍFICAS**

## G7 Ministers Declare support on Open Science for COVID-19 research

# Open Science against COVID-19: how Zenodo and OpenAIRE support the scientists



UNESCO Building peace in the minds of men and women

COVID-19

Global Education Coalition

What we do

Stories & Ideas

Resources



COVID-19 - Open science and reinforced scientific cooperation

**DESAFIO = COMPARTILHAR COM O  
FUTURO = COM QUEM, PARA QUE?**

# Preservação de páginas Web

- Wayback Machine – [archive.org/web](http://archive.org/web) [archive.it]
- 300 bilhões páginas Web
- 100 milhões de sites
- 150 linguagens
- 1 bilhão URLs por semana
  
- (uma página Web dura de 90 a 100 dias)
- Links em 70% artigos científicos desaparecem – *podridão de referência (reference rot)*

**DESAFIO = O QUE PRESERVAR E COMO  
(EROSÃO E ENVELHECIMENTO DIGITAL)  
REPOSITÓRIOS CONFIÁVEIS**

# TRUST PRINCIPLES

## scientific **data**

---

[Explore content](#) ▾

[Journal information](#) ▾


[Publish with us](#) ▾

---

[nature](#) > [scientific data](#) > [comment](#) > [article](#)

[Comment](#) | [Open Access](#) | [Published: 14 May 2020](#)

## **The TRUST Principles for digital repositories**

Dawei Lin , Jonathan Crabtree, Ingrid Dillo, Robert R. Downs, Rorie Edmunds, David Giaretta, Marisa De Giusti, Hervé L'Hours, Wim Hugo, Reyna Jenkyns, Varsha Khodiyar, Maryann E. Martone, Mustapha

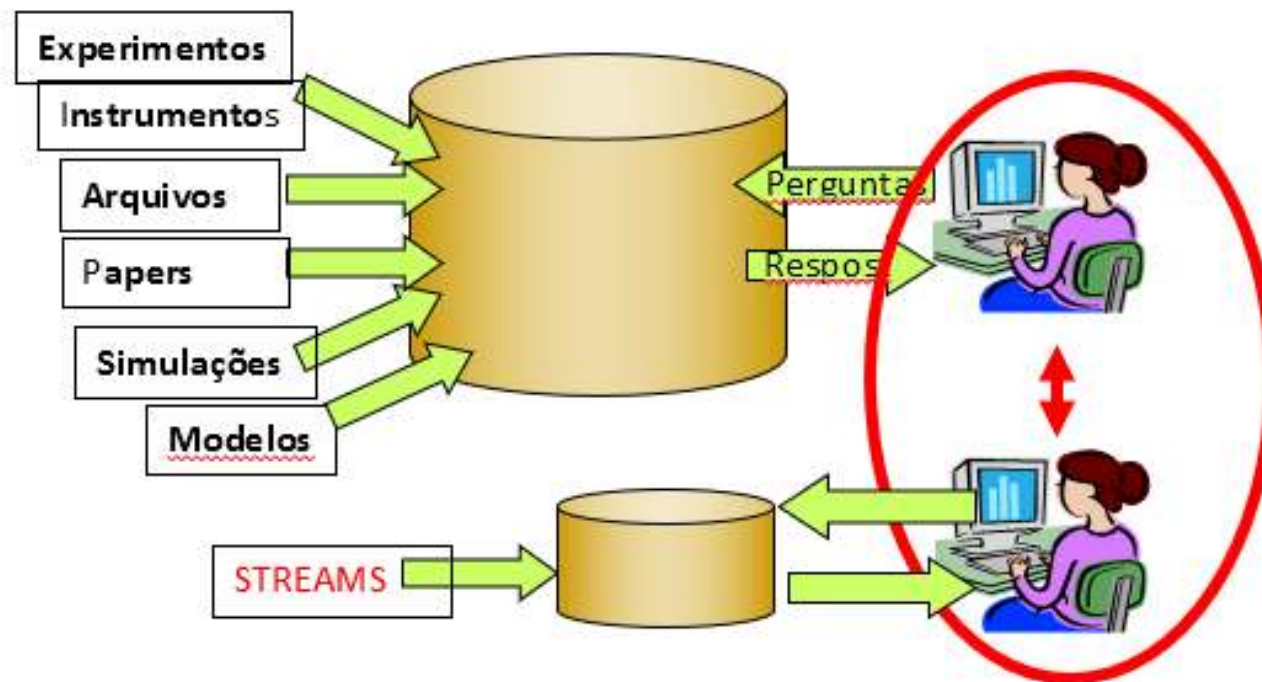
---



# TRUST PRINCIPLES - REPOSITORIES

- Transparency
- Responsibility
- User Focus
- Sustainability

# Ciência aberta – figura adaptada de Jim Gray



# Jim Gray – 1944-2007/2012

COMMUNICATIONS  
OF THE  
ACM

HOME | CURRENT ISSUE | NEWS | BLOGS | OPINION

[Home](#) / [Magazine Archive](#) / [November 2008 \(Vol. 51, No. 11\)](#) / [Jim Gray, Astronomer](#) / [Full Text](#)

CONTRIBUTED ARTICLES

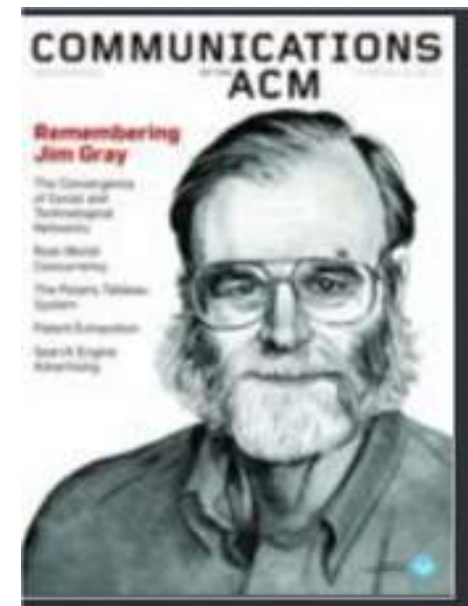
## Jim Gray, Astronomer

By Alexander S. Szalay

Communications of the ACM, November 2008, Vol. 51 No. 11, Pages 58-65

10.1145/1400214.1400231

SkyServer (dados SDSS) em SQLServer  
Mesmas ideias para outras ciencias



**OBRIGADA**  
**CMBM@IC.UNICAMP.BR**

