

Sustainable research ecosystems through Open Science

27 September 2023, ADAC13 Symposium

Marta Teperek, Programme Leader FAIR Data at Open Science NL

Slides: <https://doi.org/10.5281/zenodo.8381447>

About me:

- Researcher by training
- 10 years of professional experience in Open Science and FAIR Data
- In July 2023 joined Open Science NL (part of Dutch Research Council)
- I am **NOT** a computational scientist / big data expert



FAIR Data Programme
Leader at Open Science NL

Current trends



Exponential data storage needs



Ever-growing computational demands



Necessity for increasingly sophisticated software to process vast amounts of data



But is it all sustainable?



Concerns



Environmental impact of computational resources




Research reproducibility, data bias



Accessibility of data, methods, sustainability of software



Skills needed



Open Science enables sustainable
research ecosystems



I would like to start with an
(almost) personal story



University of Cambridge,
2010 PhD student cohort

Trying to build upon two seminal findings of an ex-postdoc from the research group

- Vincent Mirouse et al.; *LKB1 and AMPK maintain epithelial cell polarity under energetic stress*; J Cell Biol, 2007; <https://doi.org/10.1083/jcb.200702053>
- Vincent Mirouse et al.; *Dystroglycan and Perlecan Provide a Basal Cue Required for Epithelial Polarity during Energetic Stress*; Developmental Cell; 2009; <https://doi.org/10.1016/j.devcel.2008.11.006>

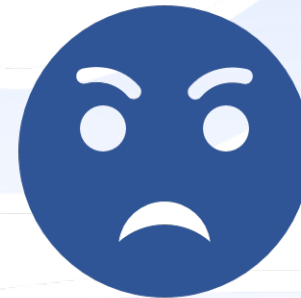
Trying to build upon two seminal findings of an ex-postdoc from the research group



2010
Excited



2011
Unsure



2012
Frustrated

Original data cannot be found

Volume 2, Issue 12

December 2013



RESEARCH ARTICLE | 23 SEPTEMBER 2013

Damage to the *Drosophila* follicle cell epithelium produces “false clones” with apparent polarity phenotypes

Timm Haack, Dan T. Bergstralh, Daniel St Johnston

+ Author and article information

Biol Open (2013) 2 (12): 1313–1320.

<https://doi.org/10.1242/bio.20134671>

Article history



Split-screen



Views



PDF



PDF+SI



Versions



Share



Tools

Timm Haack, Dan T. Bergstralh, Daniel St Johnston; Damage to the *Drosophila* follicle cell epithelium produces “false clones” with apparent polarity phenotypes. *Biol Open* 15 December 2013; 2 (12): 1313–1320. doi: <https://doi.org/10.1242/bio.20134671>



JCB

Journal of
Cell Biology

Articles ▾

Reviews & Opinion ▾

Report | April 30 2007

LKB1 and AMPK maintain epithelial cell polarity under energetic stress

Vincent Mirouse, Lance L. Swick, Nevzat Kazgan, Daniel St Johnston, Jay E. Brenman

+ Author and Article Information

J Cell Biol (2007) 177 (3): 387–392. | <https://doi.org/10.1083/jcb.200702053> | Article history



<https://doi.org/10.1083/jcb.200702053>

Developmental Cell



Volume 16, Issue 1, 20 January 2009, Pages 83–92

RETRACTED: Hyaluronan and Perlecan Provide a Basal Cue Required for Epithelial Polarity during Energetic Stress

Vincent Mirouse^{1,3}, Christina P. Christoforou², Cornelia Fritsch²,
Daniel St. Johnston¹, Robert P. Ray²  

<https://doi.org/10.1016/j.devcel.2008.11.006>

Good thing, right?
Science self-corrected
itself



But...

 **2007**

Original publication in 2007...



...retraction only in 2013

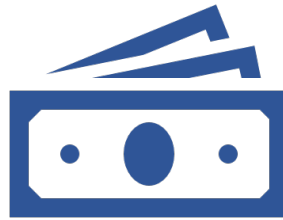
 **2013**

But...



How many others tried to
build on these findings?

What happened to them?



How much money did it
cost?



How many other false-
positive reports were
published?

www.menti.com

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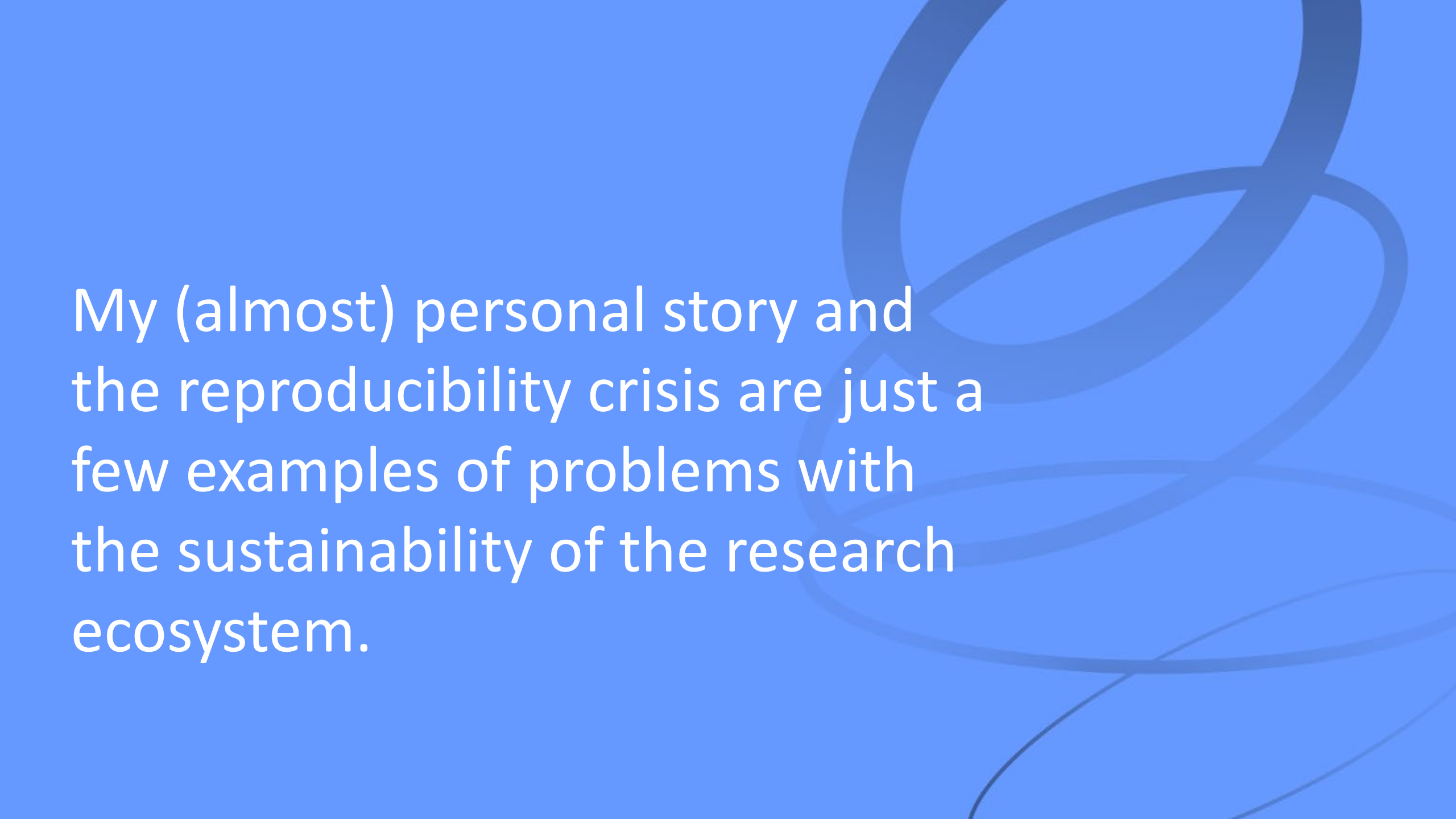
This is a global problem

70% of scientists
couldn't reproduce
another scientist's
experiments

50% failed to
reproduce their
own experiments

Baker, M. 1,500 scientists lift the lid on reproducibility. *Nature* 533, 452–454 (2016).

<https://doi.org/10.1038/533452a>



My (almost) personal story and the reproducibility crisis are just a few examples of problems with the sustainability of the research ecosystem.

Let's now focus on solutions

Open Science
as transformative force
to make research
more sustainable

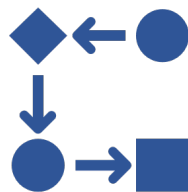




Open Science can change the entire research ecosystem



Research
outputs (data,
software...)



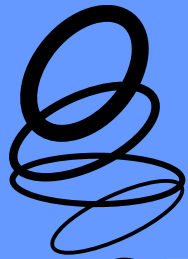
Methods



Tools and
infrastructures



People and
collaborations



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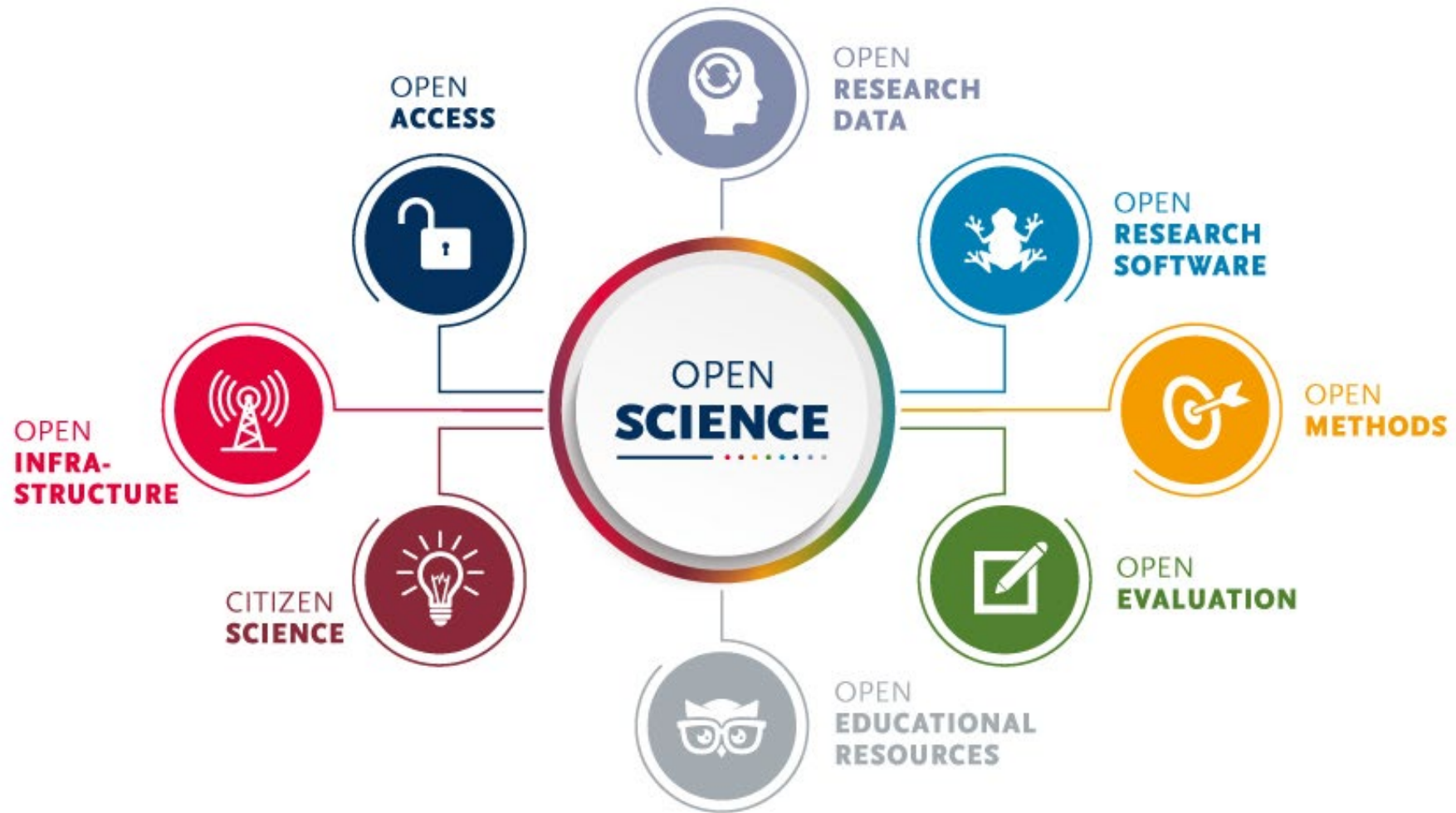
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What is Open Science?

www.menti.com

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Why Open Science? Five schools of thought



Democratic – making knowledge available to everyone



Pragmatic – knowledge creation is more efficient through collaboration



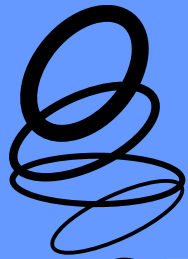
Infrastructure – research becomes more efficient through tools and services



Public – science needs to be accessible to the public



Measurement – scientific contributions today need alternative impact measures



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There are also selfish benefits of
practising open science



Compliance with funder mandates
that support open research



Greater opportunities
for collaboration



Higher citation rates

Benefits of Open Science



Greater transparency
in the research process



Increased
visibility for researchers

Greater efficiencies (and value
for money) as research does
not need to be repeated



Greater potential impact
of your research

**Open
Research
Europe**



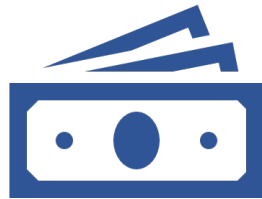
European
Commission

<https://open-research-europe.ec.europa.eu/an-introduction-to-open-research>

How?



Policy
make it
required



Incentives
make it
rewarding



Community
make it
normative



Experience
make it
easy



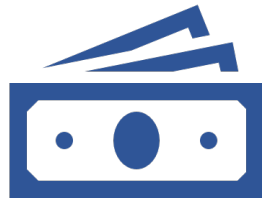
Infrastructures
make it possible

The work I will be referring to is
mostly done by others

How?



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Policy – make it required

Open access publishing

NWO aims for 100 percent Open Access. Therefore NWO requires that all publications emerging from research it funds must be made available in Open Access immediately upon publication. NWO accepts different routes to Open Access. By publications NWO means

Research policy NWO › Themes › Open Science › Research data management

Research data management

Responsible research data management is an essential component of good research practice. In addition to being safely stored and carefully curated, research data should be made available for reuse as widely and as early as possible. The guiding principle in this respect is 'as open as possible, as closed as necessary.'

<https://www.nwo.nl/en/open-access-publishing>

<https://www.nwo.nl/en/research-data-management>

Credit: Hans de Jonge, Maria Cruz, Jeroen Sondervan

Policy as an enabler

TU Delft Research Software Policy

*Wishing to make your
software open source?
TU Delft transfers
copyright to you.*

<https://doi.org/10.5281/zenodo.4629662>

Credit: Paula Martinez Lavanchy, Merlijn Bazuine, Meta Keijzer-de Ruijter, Anton Akhmerov, Susan Branchett et al.



Incentives – make it rewarding



"Since we have created the current recognition and rewards system in academia ourselves, it is also us who can change it."

Robbert Dijkgraaf, Minister of Science, Education and Culture

Recognition and Rewards Festival 2023

©Annemiek van der Kuil



Coalition for Advancing Research Assessment

Our vision is that the assessment of research, researchers and research organisations recognises the diverse outputs, practices and activities that maximise the quality and impact of research.

Evaluation of applicants at NWO



Removal of Journal Impact Factors and the H-index

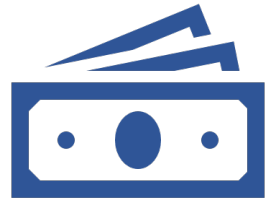


Evidence-based CV

10 key outputs (incl. datasets, methodology, conference presentations, tools, workshop, etc)
Special attention to Open Science



NWO Open Science Fund to stimulate and reward Open Science



€50,000 per project
Total €1.5M/year



Data management /
software sustainability
section



Open Science track record
of the applicant



Proposals are published
Applicants review
each other's applications

<https://www.nwo.nl/en/calls/open-science-fund-2023>

Credit to: Maria Cruz, Hans de Jonge, Sophie Schmidt, Stephanie Holst



Community – make it normative



International Network of Open Science & Scholarship Communities



16 countries



32 communities



2300+ members

Open Science Communities

*Hubs where
academics learn
from their peers
how to make their
workflows more
open.*

OSC Aarhus
OSC Athens
OSC Coimbra
OSC Copenhagen
OSC Duisburg-Essen
OSC Durham
OSC Egypt
OSC Galway
OSC Hannover



<https://osc-international.com/>

Open Science Community Starter Kit

Set up and foster a local Open Science Community

➔ Get Started



Open Science Community Incubator Program - Winter/Spring Edition 2024

In this online incubator program, we will guide and assist up to 10 colleagues from around the globe in setting-up their local Open Science Community. The incubator program is based on the OSC Starter Kit and consists of six modules:



<https://www.startyourosc.com/>

<https://osc-international.com/start-your-own-osc/>

Start small. Influence your own peers

Response of Florian Markowetz to some who say "I'd rather do real science than tidy up my data":

- "If you don't work reproducibly, you are not doing science at all"
- "Start (...) early on, so you don't waste time in the long run".



*Prof. Florian Markowetz, the
University of Cambridge*

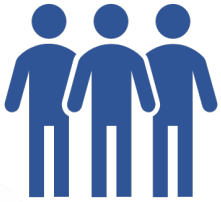
Five selfish reasons to work

reproducibly: <https://genomebiology.biomedcentral.com/articles/10.1186/s13059-015-0850-7>



Experience – make it easy

Funding for digital competence centres (DCCs)



Local DCCs: data managers & research software engineers supporting researchers locally



Thematic DCCs: domain specific challenges and coordination

<https://tdcc.nl/>

<https://www.nwo.nl/en/calls/local-digital-competence-centers-ii>

Credit: Mark van Assem, Femke Stephan, Timo Schomann, Naomi Messing

Call for Sustainable Software 2023



Supporting "communities of researchers who require their software to meet higher quality standards to ensure the continuity and advancement of their research."

- Receive 2 person-year (PYR) in-kind support from eScience Center RSEs on improving the sustainability of your software.



Infrastructures – make it possible

Openness is key to sustainable infrastructures

"...by facilitating community-driven development, we can work towards sustainable infrastructures, which are agile and able to quickly respond to changing (...) needs. (...) by co-developing and partnering with the research community, we invest in solutions which are valued and needed."



Call for proposals: Open Infrastructure Fund

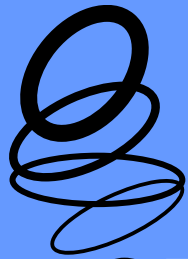
IOI

The fund aims to strengthen sustainability and resilience and increase the adoption of open infrastructure that underpins research and knowledge creation.

- Level of funding: 5,000-25,000 USD
- 200 applications from all over the world
- Proposals openly available
- Peer reviews assessment openly available

Credit: Emmy Tsang, Invest in Open Infrastructure

<https://investinopen.org/blog/open-infrastructure-fund-pilot-cfp/>



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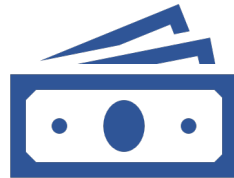
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Change is coming

Letter of the Ministry of Science and Education – 17 June 2022



Open Science must become the norm



20mIn EUR per year to accelerate the transition

We hope to have
some exciting
announcements in
early 2024 :)



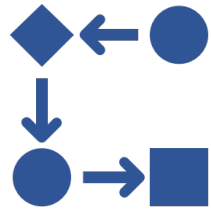


Open Science enables sustainable
research ecosystems

Open Science is a collective action – each one of us can make a difference



Sharing of
data, code...



Agreeing on
workflows



Giving time



Encouragement
& Appreciation

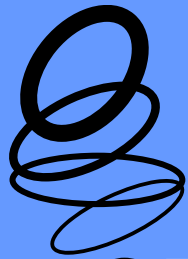


Engagement in
local initiatives
Support

Thank you:

- Open Science NL team members for feedback, support and inspiration (in particular Maria Cruz and Hans de Jonge)
- Various colleagues and organisations for inspiration (NWO, TU Delft, 4TU.ResearchData, Open Science Communities, Paula Martinez Lavanchy, Timm Haack, Florian Markowetz, Laurent Gatto, Emmy Tsang, and many, many others...)
- Tjerk Straatsma, France Boillod-Cerneux and Christophe Calvin for feedback and advice
- All of you for your attention





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Thank you!

Marta Teperek, m.tepererek@nwo.nl

www.openscience.nl

Slides: <https://doi.org/10.5281/zenodo.8381447>