Opportunities to Improve Academic Research Through Open Research Practices

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DOI: 10.6084/m9.figshare.6291668

June 4–6, 2018

Who am I?

University of Wisconsin-Stout

Design, robotics, medical devices

Engineering education and practice

Open engineering

WHAT

What is open research?

The rules are <u>simple</u>

Make the work <u>accessible</u>

What do you mean accessible?

Accessible is <u>obtainable</u>

Accessible is <u>understandable</u>

Accessible is <u>reproducible</u>
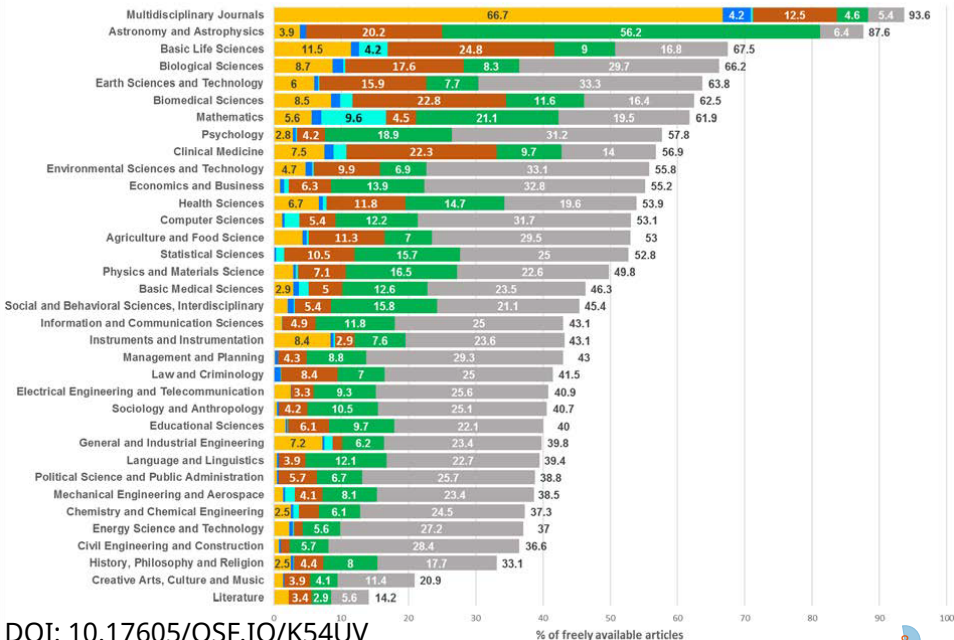
Accessible is <u>inclusive</u>

As open as desired

There is no wrong way to be open

Find the level of open that works

There is a community out there
willing to help!

WHY

Legend: Gold OA · Hybrid OA · Delayed OA · Bronze OA · Green OA (Only) · Free Availability (Only)

Field	Segment values (bar order)	Total (% freely available)
Multidisciplinary Journals	66.7, 4.2, 12.5, 4.6, 5.4	93.6
Astronomy and Astrophysics	3.9, 20.2, 56.2, 6.4	87.6
Basic Life Sciences	11.5, 4.2, 24.8, 9, 16.8	67.5
Biological Sciences	8.7, 17.6, 8.3, 29.7	66.2
Earth Sciences and Technology	6, 15.9, 7.7, 33.3	63.8
Biomedical Sciences	8.5, 22.8, 11.6, 16.4	62.5
Mathematics	5.6, 9.6, 4.5, 21.1, 19.5	61.9
Psychology	2.8, 4.2, 18.9, 31.2	57.8
Clinical Medicine	7.5, 22.3, 9.7, 14	56.9
Environmental Sciences and Technology	4.7, 9.9, 6.9, 33.1	55.8
Economics and Business	6.3, 13.9, 32.8	55.2
Health Sciences	6.7, 11.8, 14.7, 19.6	53.9
Computer Sciences	5.4, 12.2, 31.7	53.1
Agriculture and Food Science	11.3, 7, 29.5	53
Statistical Sciences	10.5, 15.7, 25	52.8
Physics and Materials Science	7.1, 16.5, 22.6	49.8
Basic Medical Sciences	2.9, 5, 12.6, 23.5	46.3
Social and Behavioral Sciences, Interdisciplinary	5.4, 15.8, 21.1	45.4
Information and Communication Sciences	4.9, 11.8, 25	43.1
Instruments and Instrumentation	8.4, 2.9, 7.6, 23.6	43.1
Management and Planning	4.3, 8.8, 29.3	43
Law and Criminology	8.4, 7, 25	41.5
Electrical Engineering and Telecommunication	3.3, 9.3, 25.6	40.9
Sociology and Anthropology	4.2, 10.5, 25.1	40.7
Educational Sciences	6.1, 9.7, 22.1	40
General and Industrial Engineering	7.2, 6.2, 23.4	39.8
Language and Linguistics	3.9, 12.1, 22.7	39.4
Political Science and Public Administration	5.7, 6.7, 25.7	38.8
Mechanical Engineering and Aerospace	4.1, 8.1, 23.4	38.5
Chemistry and Chemical Engineering	2.5, 6.1, 24.5	37.3
Energy Science and Technology	5.6, 27.2	37
Civil Engineering and Construction	5.7, 28.4	36.6
History, Philosophy and Religion	2.5, 4.4, 8, 17.7	33.1
Creative Arts, Culture and Music	3.9, 4.1, 11.4	20.9
Literature	3.4, 2.9, 5.6	14.2

% of freely available articles

To have an impact!

People can't access the work

Many institutions do not have subscriptions

Non-academics can't understand the work

Motivated individuals can't recreate the work

Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits.

...to aid in diffusing among the people of the United States useful and, practical information...

More exposure for your work

Practitioners can apply your findings

Researchers in developing countries can see your work

Higher citation rates

Taxpayers get value for money

Compliant with grant rules

The public can access your findings

Your research can Influence policy

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HOW

How to be open

Make the work <u>obtainable</u>

Make the work <u>understandable</u>

Make the work <u>reproducible</u>

Make the work <u>inclusive</u>

To do this

Preprint and self-archive, publish OA

Use accessible language

Use reproducible workflows

Include diverse perspectives

There are many resources available

ENGINEERING
engrxiv
ARCHIVE

The Journal of
Open Engineering

openENGR

Open Educational Resources?

Open practices can lead to some amazing outcomes

Everything from hardware to software to workflows.

The Story of Pat Delany, Open Source Machine Tools Advocate

Joshua Pearce: Open hardware

GliaX Stethoscope; Image

But what about patents?[1]

Of course the rules of prior art still apply

In the US, preprinting may help establish priority

Is patenting the best route to having an impact?

[1]I am not an attorney and this is not legal advise.

"As we enjoy great advantages from the inventions of others, we should be glad of an opportunity to serve others by any invention of ours, and this we should do freely and generously."

Barriers to adoption

Need for training and updated workflows

Career reward structures

Pressures of capitalism

Opportunities to support open (broadly)

Create an institutional mandate

Use tech transfer offices to push for greater impact

Empower and fund university libraries to help

Support training in open practices

Opportunities to support open (specifically)

Consider accessibility and impact of research products in T&P guidelines

Recognize contributions of software and data alongside publications

Reduce importance of "traditional" venues

Guiding Principles

Budapest Open Access Initiative

Declaration on Research Assessment

FAIR Data Principles

Thank You!