

Building Open in Engineering

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#openengr

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Who am I?

University of Wisconsin-Stout

Design, robotics, medical devices

Engineering education and practice

WHAT

What is open engineering?

The rules are simple

Make the work accessible

What do you mean accessible?

Accessible is obtainable

Accessible is understandable

Accessible is reproducible

Accessible is inclusive

As open as desired

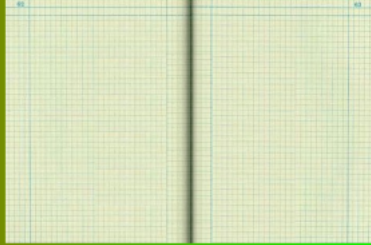
There is no wrong way to be open

Find the level of open that works

There is a community out there
willing to help!

Preprint or self-archive

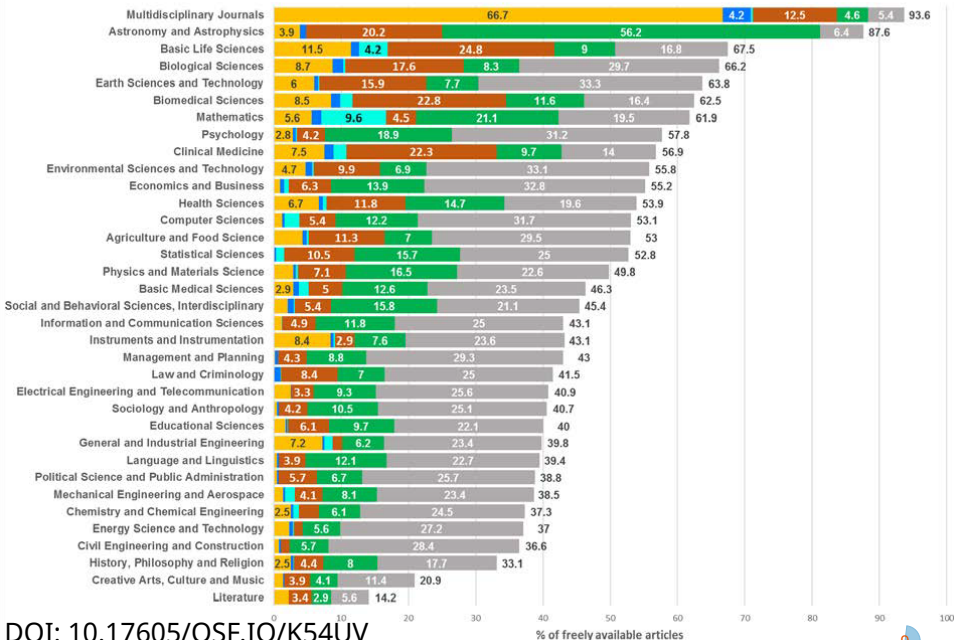
Openness is a spectrum.



Open notebook

WHY

Gold OA Hybrid OA Delayed OA Bronze OA Green OA (Only) Free Availability (Only)



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...

Morrill Land-Grant Act, 1862; Smith-Lever Act, 1914

Hold paramount
the safety, health,
and welfare of the
public.

Create work that is reproducible

All needed components are
available

The workflow can be replicated

Can recreate it 20 years from now



HOW

How to be open

Make the work obtainable

Make the work understandable

Make the work reproducible

Make the work inclusive

To be obtainable

Preprint and self-archive

Publish open access

Open up other artifacts

Preprints...

- speed up dissemination
- should be licensed and formatted to facilitate reuse
- provide a record of priority
- do not lead to being scooped
- provide access to scholarly content that would otherwise be lost

Preprints...

- **do not** imply **low quality**
- supports the **rapid evaluation** of controversial results
- **do not** typically preclude **publication**
- can further **inform grant review** and **academic advancement**
- one size **does not** fit **all**

To be understandable

Think about the audience

Consider accessible language

Focus on applications/implications

To be reproducible

Use reproducible workflows

Use open and non-proprietary
softwares

Provide what others will need

To be inclusive

Accommodations for all who might want to access your work?

Project teams that include a diversity of perspectives

Sustained, evidence-based efforts to remove established cultural and structural barriers and recognize implicit biases

There are many resources available

Make the work available in the
correct format

How will others find it and interact
with it?

Use the available tools!



figshare



Open Science Framework



GitHub

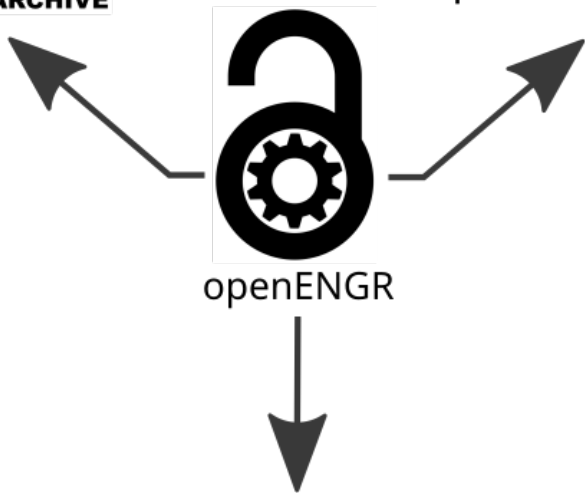


ORCID

Connecting Research
and Researchers



docker

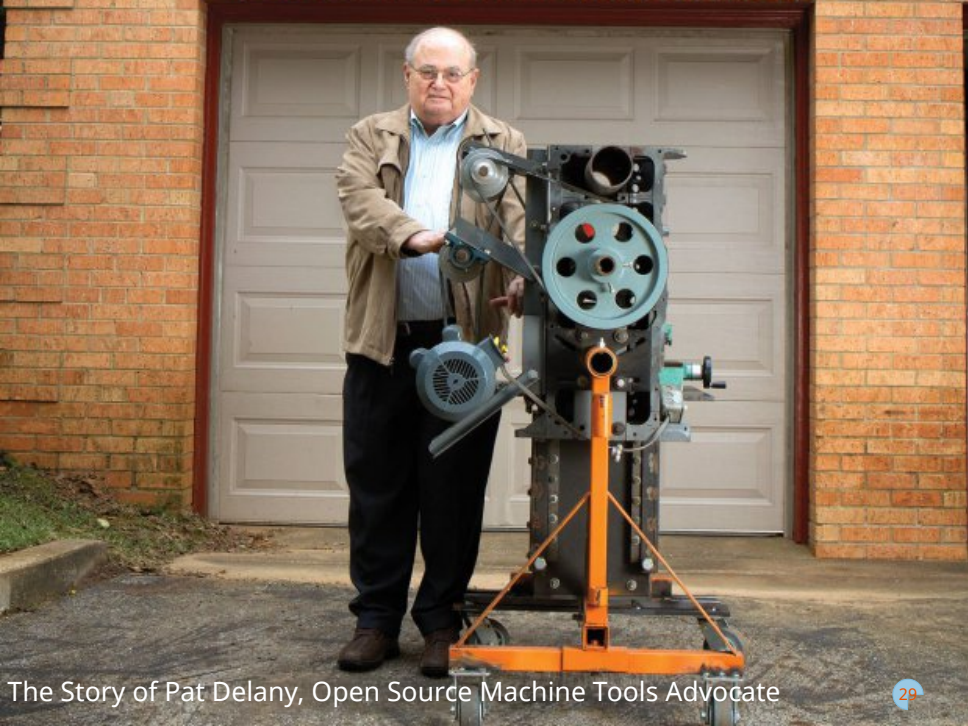


Open Educational Resources?

Examples

Open engineering can lead to some amazing outcomes

Everything from hardware to software to workflows.



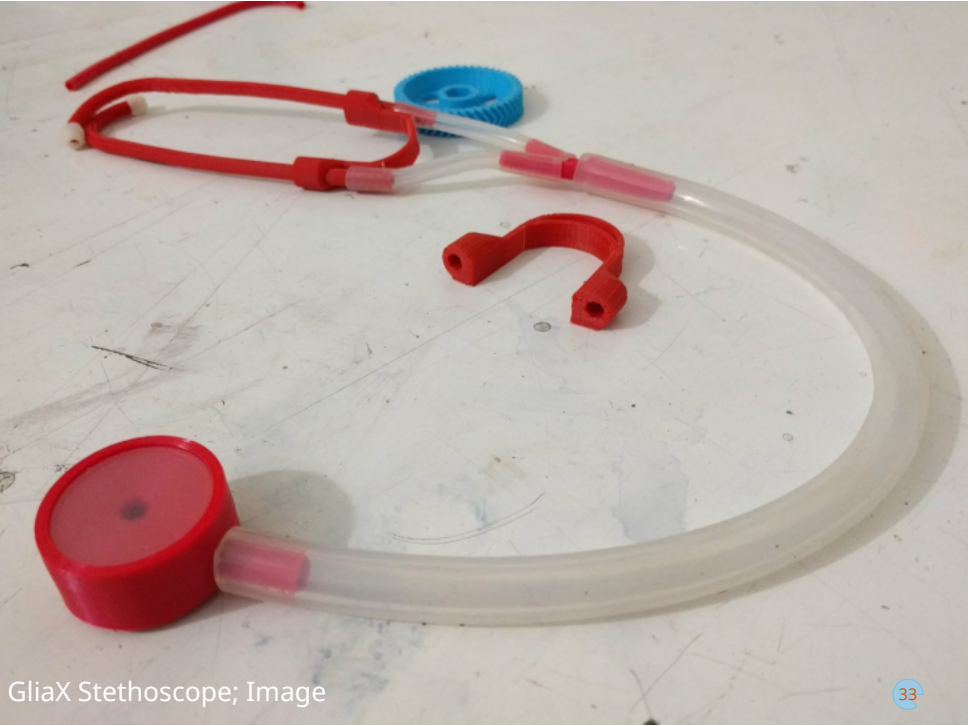
The Story of Pat Delany, Open Source Machine Tools Advocate





Jessica Vechakul: Zambulance





GliX Stethoscope; Image

Other examples

Fully public grant proposals

Cover letters, research statements,
etc.

An open pledge

Barriers to adoption

Need for training and updated workflows

Career reward structures

Pressures of capitalism

But what about patents?¹

Of course the rules of prior art still apply

In the US, preprinting may help establish your priority

Is patenting your best route to having an impact?

¹I 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."

Guiding Principles

Budapest Open Access Initiative

Declaration on Research
Assessment

FAIR Data Principles

Further information

Dr. Kyle Niemeyer on Open Science

Why Open Research with Dr. Erin
McKiernan

WhyOpenResearch.org



Thank You!