

# 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

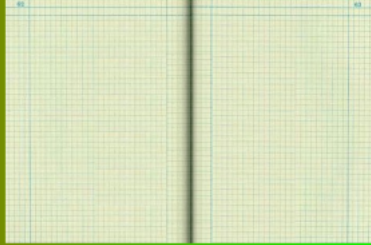
There is no wrong way to be open

Find the level of open that works

There is a community out there  
willing to help!

Preprint or self-archive

Openness is a spectrum.

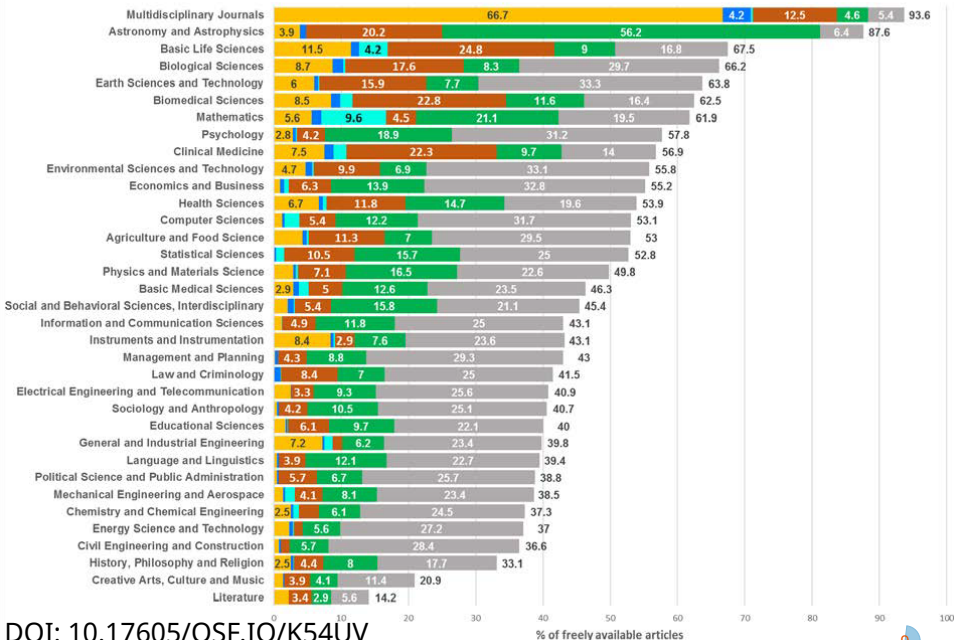


Open notebook

**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

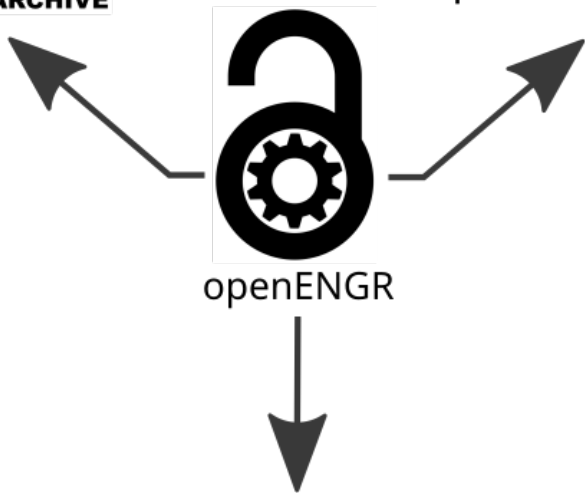


ORCID

Connecting Research  
and Researchers



docker

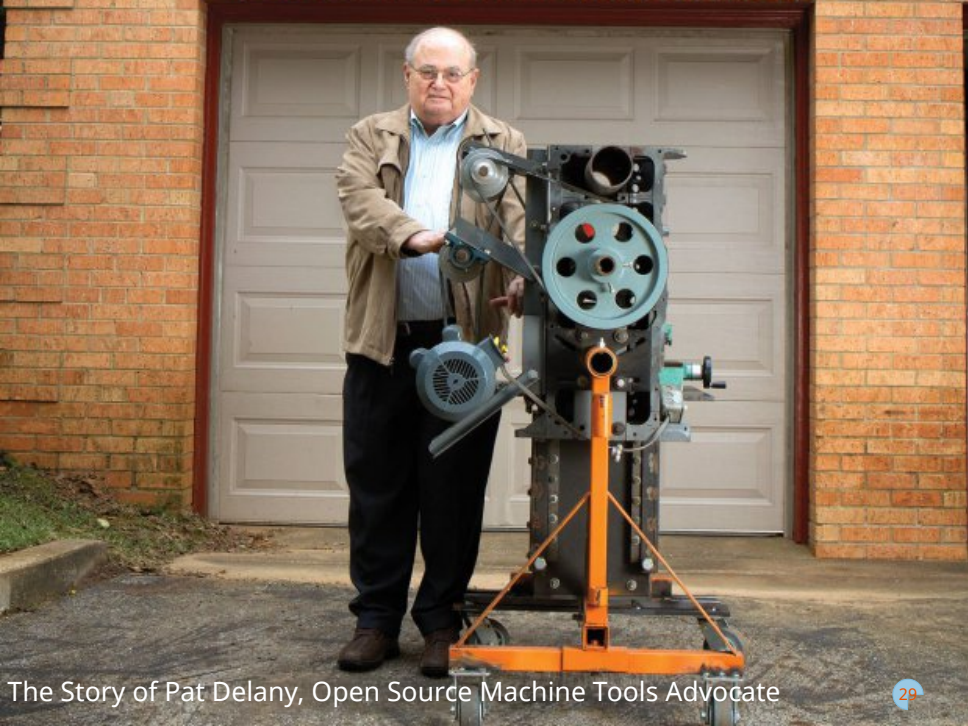


Open Educational Resources?

# 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



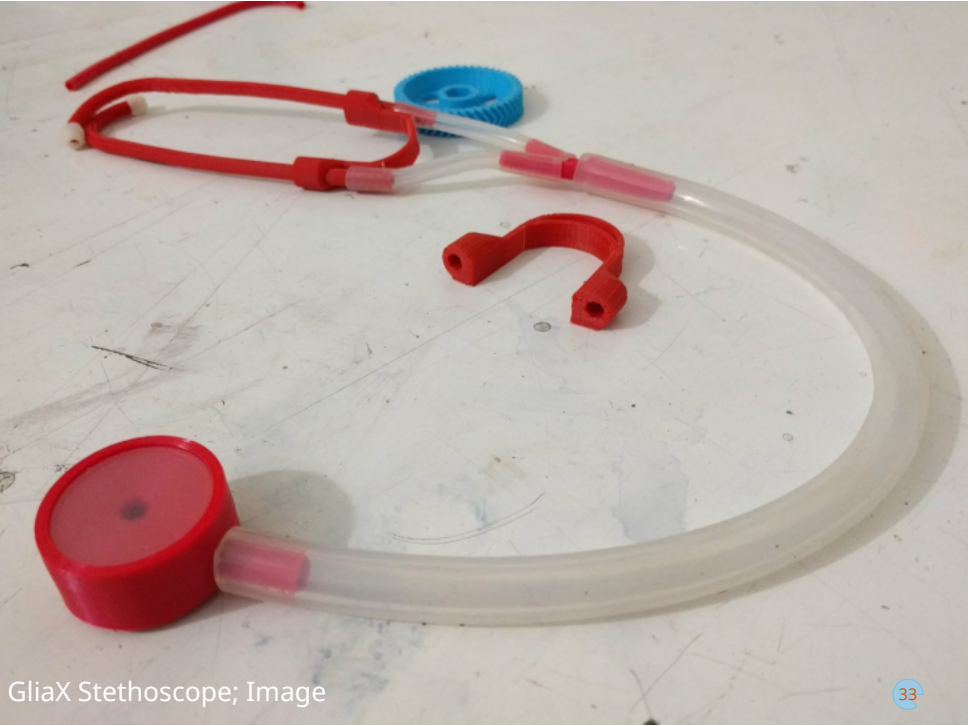


Jessica Vechakul: Zambulance









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?<sup>1</sup>

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?

<sup>1</sup>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."

# 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](http://WhyOpenResearch.org)



Thank You!