

Worcester Polytechnic Institute

Digital WPI

---

Interactive Qualifying Projects (All Years)

Interactive Qualifying Projects

---

2020-05-13

## Developing Sustainable Open Source Strategies for Research

Alex J. Harrigan

*Worcester Polytechnic Institute*

Amelia Nishimura

*Worcester Polytechnic Institute*

Matthew St Jean

*Worcester Polytechnic Institute*

Thierry L. de Crespigny

*Worcester Polytechnic Institute*

Follow this and additional works at: <https://digitalcommons.wpi.edu/iqp-all>

---

### Repository Citation

Harrigan, A. J., Nishimura, A., Jean, M. S., & de Crespigny, T. L. (2020). *Developing Sustainable Open Source Strategies for Research*. Retrieved from <https://digitalcommons.wpi.edu/iqp-all/5762>

This Unrestricted is brought to you for free and open access by the Interactive Qualifying Projects at Digital WPI. It has been accepted for inclusion in Interactive Qualifying Projects (All Years) by an authorized administrator of Digital WPI. For more information, please contact [digitalwpi@wpi.edu](mailto:digitalwpi@wpi.edu).



# Sustainable Open Source Strategy



Alex Harrigan, Amelia Nishimura, Matt St Jean, and Thierry de Crespigny



The original source code of **Open Source** software is freely available online to be viewed, copied, redistributed, and modified.

# Why Open Source in Research?

Easily  
Obtainable



Transparent  
Workflow

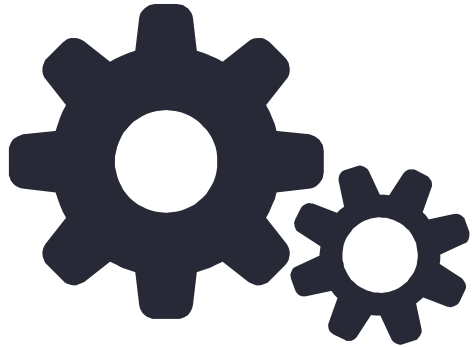


Streamlines  
Collaboration

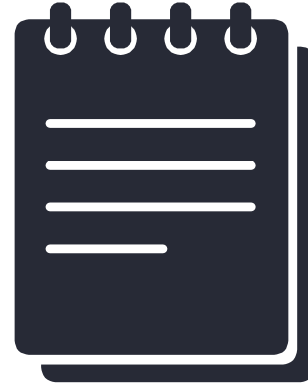


# Current State of Research Software

Technical Inexperience



Institutional Practices



# Obstacles to Changing Software Practices in Research

Training takes time and money



Publishing good software isn't rewarded



# Searching for a Solution

Our goals for the project were to:

- Assess the IGB staff's open source experience
- Spread awareness of open source ideas
- Create policy guidelines for the IGB
- Create a set of general suggestions for researchers



# The IGB can Benefit from Open Source



**Leibniz-Institute of  
Freshwater Ecology  
and Inland Fisheries**



# Project Objectives

- **Evaluate** the challenges and opportunities for open source software practices
- **Identify** the steps that will lead to successful open source software practices
- **Develop** policy guidelines and suggestions for researchers interested in open source

# Information Gathering

## Two Focus Groups

- IGB Staff
- Digital Humanities Researchers



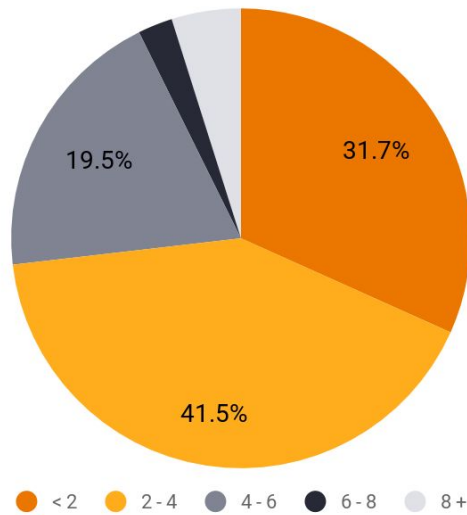
## Conducted Surveys and Interviews

- 42 IGB Survey Responses
- 6 Digital Humanities Responses
- 12 Total Interviews

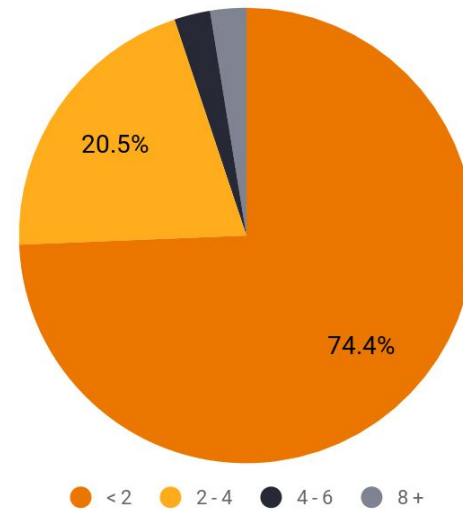


# Software is Integral to Research Staff

Hours per day participants spend using scientific software

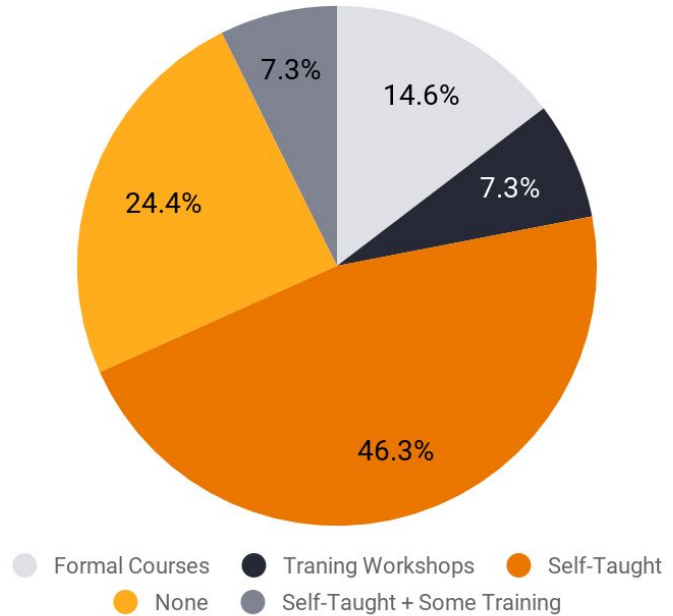


Hours per day participants spent developing software



# Researchers are not Professional Programmers

Level of Participant Software Training



## There is a Desire to Learn Skills

“Getting into a healthy routine of documenting and commenting scripts would be very useful” (IGB researcher)



# A Culture of Collaboration Already Exists

“We do share our code on certain applications and change it for slightly different purposes” (IGB Researcher)



# There is no Institutional Support for Open Source

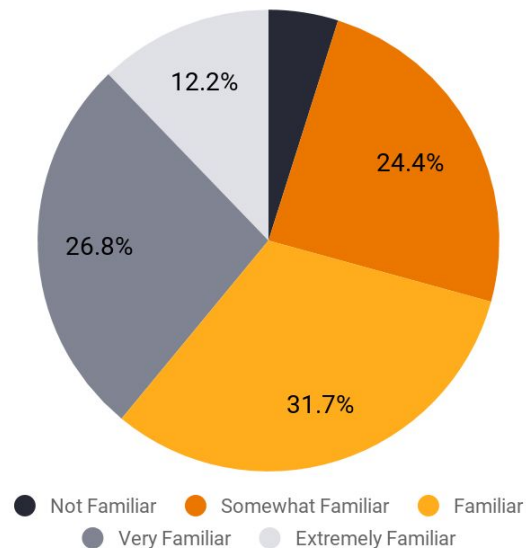
“Programming is part of our job, it's not something you get rewards for.” (IGB staff member)



# Open Source CAN Work

“I think open is, perhaps to a fault, an understood characteristic of Digital Humanities work and anyone not making their materials open looks a little out of place”

Participant familiarity with open source





# Primary Takeaways

Institutional support is necessary for open source publication

Importance of confidence in the code that is created



# Administrative Solutions

## Policy Brief for IGB Administration

- Revamp the internal bitbucket git server for sharing.
- Host seminars/workshops on software development.
- Open Source Licensing/Journals .
- A LOM System change that gives credit for published software



## Individual Solutions

Flyer for distribution at  
the IGB

# OPTIMIZE YOUR RESEARCH WITH OPEN SOURCE

---

## WHY OPEN SOURCE?

You've probably heard of open source. But did you know that it can help you improve your code and research overall?

Publishing your code or work open source can:

1. Ensure easy access later if needed (who knows when you may need it!)
2. Enable you to keep track of the program's development
3. Ensure the reproducibility of your work by making the software you used easy to find. No one likes having to re-create code.
4. Help resolve errors in your work. The open source community are a helpful bunch
5. Make it easy for others to use and build on your work
6. Encourage others to give feedback quickly. Avoid those long wait times

# Broader Applications

General Guidelines for  
all Researchers





# Questions?



# Credits and Sources

Asay, M. (2019, October 18). Open source hardware: The problems and promise. Retrieved from <https://www.techrepublic.com/article/open-source-hardware-the-problems-and-promise/>

Crouch, S., Hong, N. C., Hettrick, S., Jackson, M., Pawlik, A., Sufi, S., ... Parsons, M. (2013). The Software Sustainability Institute: Changing Research Software Attitudes and Practices. *Computing in Science & Engineering*, 15(6), 74–80. doi: 10.1109/mcse.2013.133

Hannay, J. E., Macleod, C., Singer, J., Langtangen, H. P., Pfahl, D., & Wilson, G. (2009). How do scientists develop and use scientific software? *2009 ICSE Workshop on Software Engineering for Computational Science and Engineering*. doi: 10.1109/secse.2009.5069155

Ince, D. C., Hatton, L., & Graham-Cumming, J. (2012). The case for open computer programs. *Nature*, 482(7386), 485–488. doi: 10.1038/nature10836

Joppa, L. N., Mcinerny, G., Harper, R., Salido, L., Takeda, K., Ohara, K., ... Emmott, S. (2013). Troubling Trends in Scientific Software Use. *Science*, 340(6134), 814–815. doi: 10.1126/science.1231535



- Krogh, V., Haefliger, Spaeth, & Wallin. (2012). Carrots and Rainbows: Motivation and Social Practice in Open Source Software Development. *MIS Quarterly*, 36(2), 649. doi: 10.2307/41703471
- Larivière, V., Haustein, S., & Mongeon, P. (2015). The Oligopoly of Academic Publishers in the Digital Era. *Plos One*, 10(6). doi: 10.1371/journal.pone.0127502
- Pattabhiramaiah, A., Sriram, S., & Manchanda, P. (2018). Paywalls: Monetizing Online Content. *Journal of Marketing*, 83(2), 19–36. doi: 10.1177/0022242918815163
- Pearce, J. M. (2015). Return on investment for open source scientific hardware development. *Science and Public Policy*, 43(2), 192–195. doi: 10.1093/scipol/scv034
- Pianosi, F., Sarrazin, F., & Wagener, T. (2020). How successfully is open-source research software adopted? Results and implications of surveying the users of a sensitivity analysis toolbox. *Environmental Modelling & Software*, 124, 104579. doi: 10.1016/j.envsoft.2019.104579
- Schwab, M., Karrenbach, N., & Claerbout, J. (2000). Making scientific computations reproducible. *Computing in Science & Engineering*, 2(6), 61–67. doi: 10.1109/5992.881708
- Siler, K. (2017). Future Challenges and Opportunities in Academic Publishing. *Canadian Journal of Sociology*, 42(1), 83–114. doi: 10.29173/cjs28140
- Pedersen, T. (2008). Empiricism Is Not a Matter of Faith. *Computational Linguistics*, 34(3), 465–470. doi: 10.1162/coli.2008.34.3.465



# Credits and Sources

Presentation template by [SlidesCarnival](#)

<https://www.sciencedirect.com/science/article/pii/S136481521930619X>

<https://ieeexplore.ieee.org/document/6731384>

<https://www.jstor.org/stable/41703471>

<https://science.sciencemaq.org/content/340/6134/814>

<https://dl.acm.org/doi/10.1145/1.1882373>(technical debt) -could not find, cite acm in general

<https://www.techrepublic.com/article/open-source-hardware-the-problems-and-promise/> (open hardware)

<https://www.nature.com/articles/nature10836> (Software Sharing for Research)

<https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=881708> (Software reproducibility)

<https://www.jstor.org/stable/90009690>(Journal Paywalls)

<https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5069155>

<https://journals.sagepub.com/doi/10.1177/0022242918815163>

<https://academic.oup.com/spp/article/43/2/192/2414129>

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0127502>