Open and Reproducible Science

Data Science for Coral Reefs

CRESCYNT - Data Rescue Workshop – 2018

Adapted by Julien Brun from Mark Schildhauer, SNAPP training 2015

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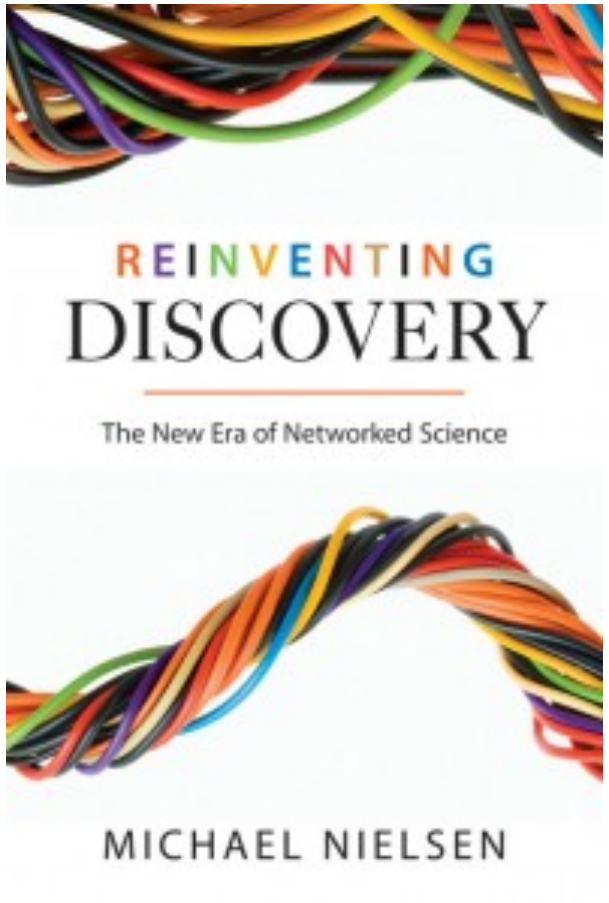
crowdsourcing



collective intelligence

micro-expertise

transdisciplinary

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Why Open Science now?

- Technology is available (World Wide Web)
- Growing politicization of science:
  need for transparency
- Importance of large-scale/interdisciplinary science
- Efficiencies in re-using or sharing available data, code

A return to fundamental premise of science:
objective, repeatable, replicable, "general"

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Need for Open Science

"It is essential that the scientific community work urgently to make standards for analyzing, reporting, providing access to, and stewardship of research data operational…

Failure to make research data and related information accessible not only impedes science, it also breeds conflicts."

Ralph J. Cicerone, President of U.S. National Academy of Sciences ("Ensuring Integrity in Science", Science 5Feb2010, p. 624.)

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Open Science

- ✧Open Access
- ✧Open Data
- ✧Open Source
- ✧Open Notebook

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- ✧Open Access
- ✧Open ~~Data~~ Products
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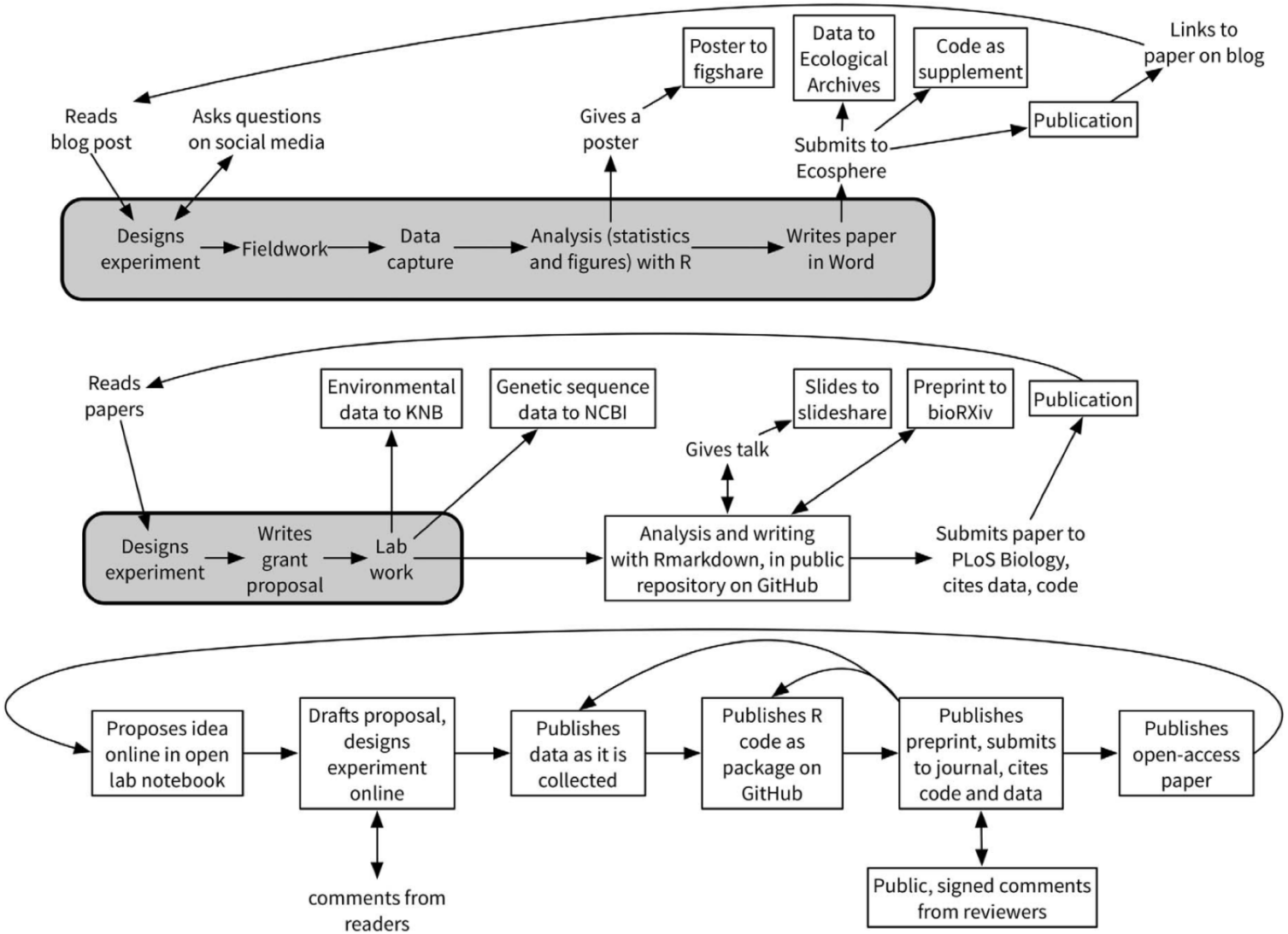
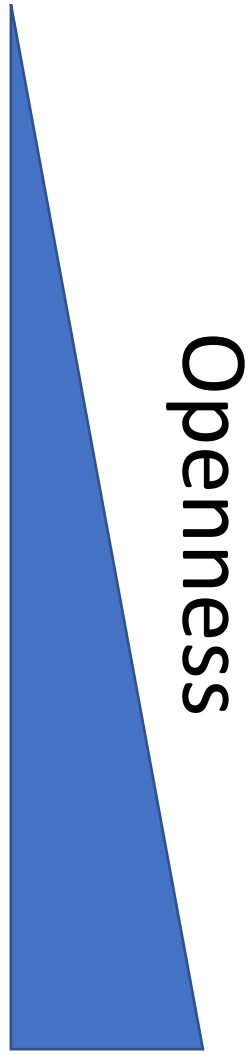
Open Science Workflows





Hampton et al., 2015

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Open Access

Rapid, highly affordable or free
access to the latest scientific findings

--

for everyone/anyone

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Open Data

Rapid, highly affordable or free access to ALL the data supporting scientific findings

Open data is data that are:

- Properly licensed for re-use
- Accessible w/o gates (e.g., paywall, login)
- Use open formats (formats you can work with)

FAIR Principles

- **F**indability
- **A**ccessibility
- **I**nteroperability
- **R**eusability

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Few Check

- ✧Open Access
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Open Notebook

Rapid, highly affordable or free access to the design details, logistical considerations, analytical decision points and justifications, anecdotes/marginalia, etc. that support scientific findings

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Open Source

Rapid, highly affordable or free access to the algorithms and other code used in an analysis, to enable examination and verification of appropriateness, and ideally suitable for re-use

Obstacles to Open Science?

- Lack of time and funds
- Lack of rewards: money, status, promotion
- Breaking from traditional publication model
- Other concerns: scooping? poaching?

Some Resources

Nielsen, Michael. 2011. *Reinventing Discovery: The New Era of Networked Science.* Princeton University Press. 208pp.

Hampton et al. 2015. *The Tao of open science for ecology*. Ecosphere 6(7), article 120.

Wilkinson et al. 2016. The FAIR Guiding Principles for scientific data management and stewardship, Sci. Data. https://doi.org/10.1038/sdata.2016.18

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