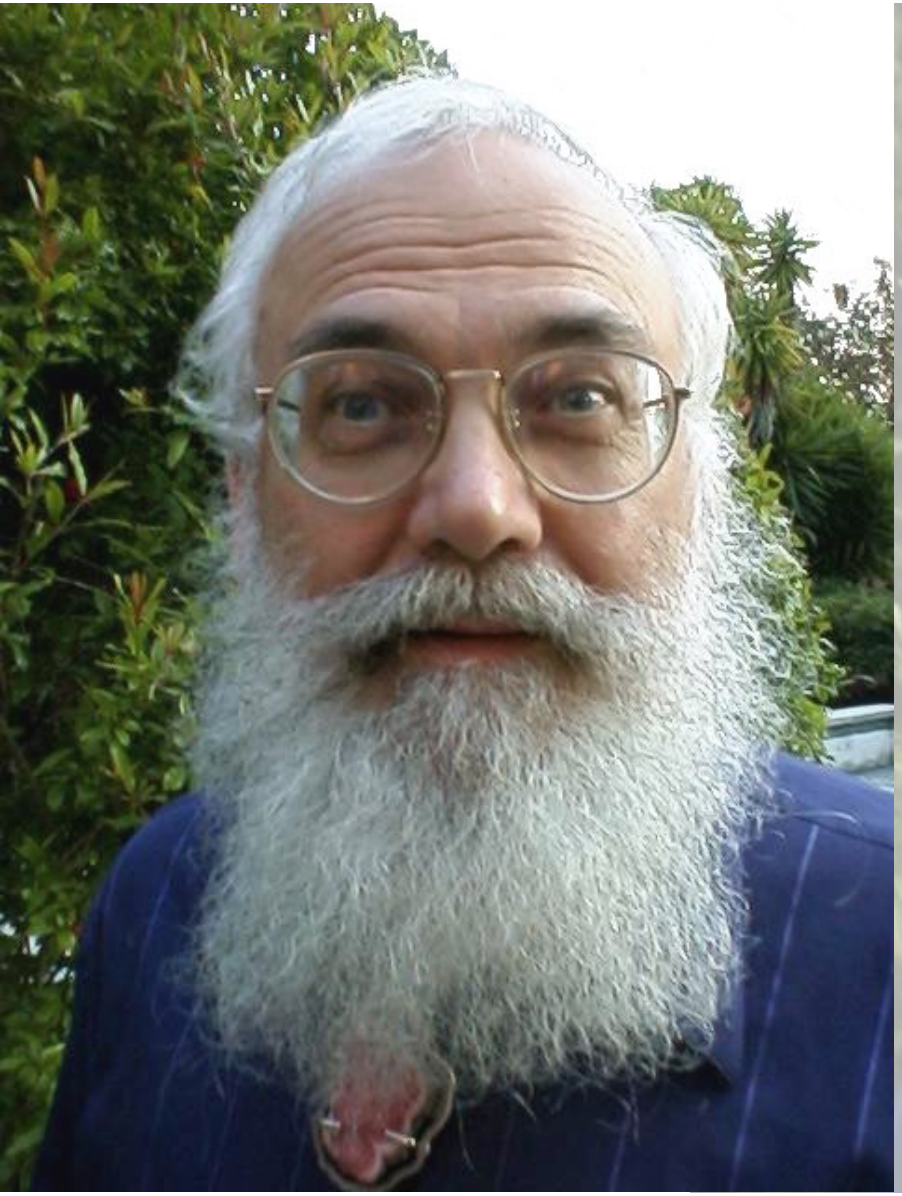
jupytercon

THE OFFICIAL JUPYTER CONFERENCE

Aug. 23-25, 2017 – New York, NY

Design for Reproducibility

@LorenaABarba



Jon F. Claerbout
Professor Emeritus of Geophysics
Stanford University

... pioneered the use of computers in processing and filtering seismic exploration data [Wikipedia]

... from 1991, he required theses to conform to a standard of reproducibility.

Def.— Reproducible research

Authors provide all the necessary data and the computer codes to run the analysis again, re-creating the results.

Adapted from:
Schwab, M., Karrenbach, N., Claerbout, J. (2000) “Making scientific computations reproducible,” *Computing in Science and Engineering* Vol. 2(6):61–67

PERSPECTIVE

Reproducible Research in Computational Science

Roger D. Peng

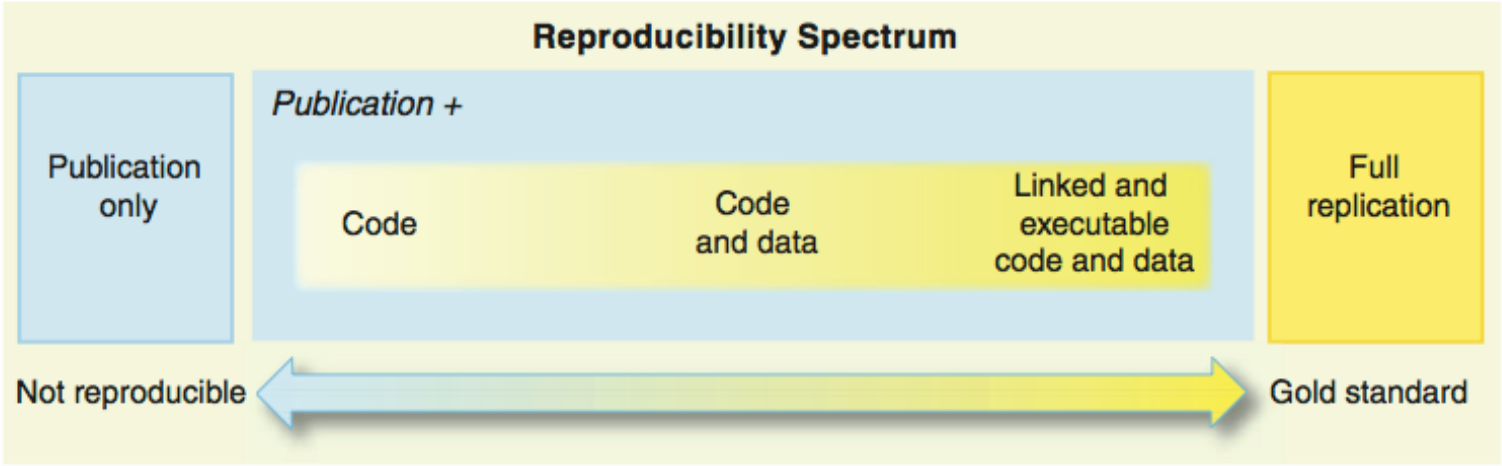


Fig. 1. The spectrum of reproducibility.

Def.— Replication

Arriving at the same scientific findings as another study, collecting new data (possibly with different methods) and completing new analyses.

Roger D. Peng (2011), “Reproducible Research in Computational Science” *Science*, Vol. 334, Issue 6060, pp. 1226-1227

“I’ve learned that interactive programs are slavery (unless they include the ability to arrive in any previous state by means of a script).”

— Jon Claerbout

jupyter

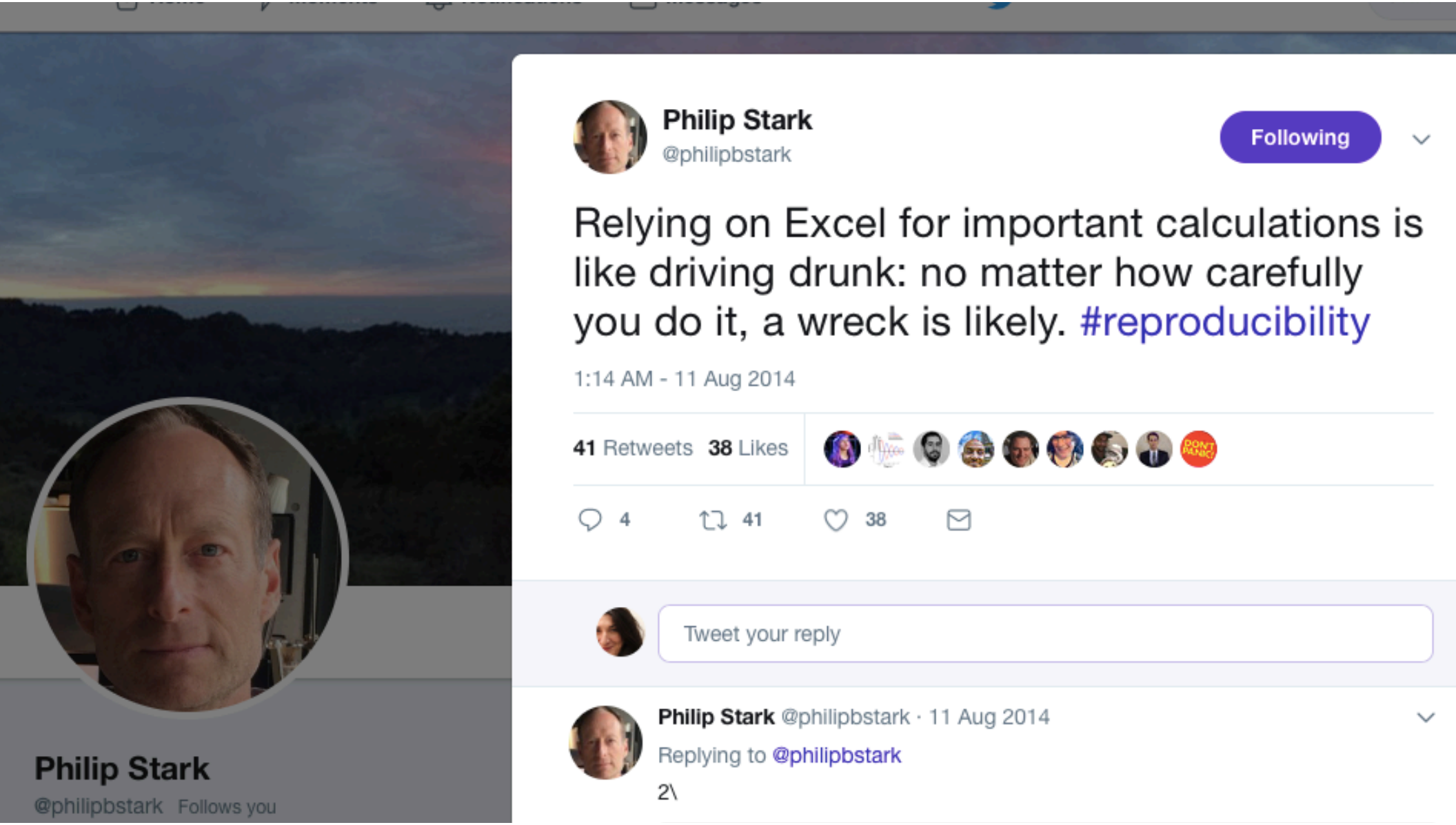
A set of open-source tools for interactive and exploratory computing.

Jupyter grant proposal:

"...the core problem we are trying to solve is the collaborative creation of **reproducible** computational narratives."

Interactive →← Reproducible

Interactive →← Reproducible


Philip Stark
@philipbstark
Following
Relying on Excel for important calculations is like driving drunk: no matter how carefully you do it, a wreck is likely. #reproducibility
1:14 AM - 11 Aug 2014
41 Retweets 38 Likes
4
41
38
Tweet your reply
Philip Stark @philipbstark · 11 Aug 2014
Replying to @philipbstark
2\
Philip Stark
@philipbstark Follows you

On spreadsheets:

"...the user interface conflates input, output, code, and presentation, making testing code and discovering bugs difficult."

— Philip Stark, *Science is 'show me,' not 'trust me'* (2015)

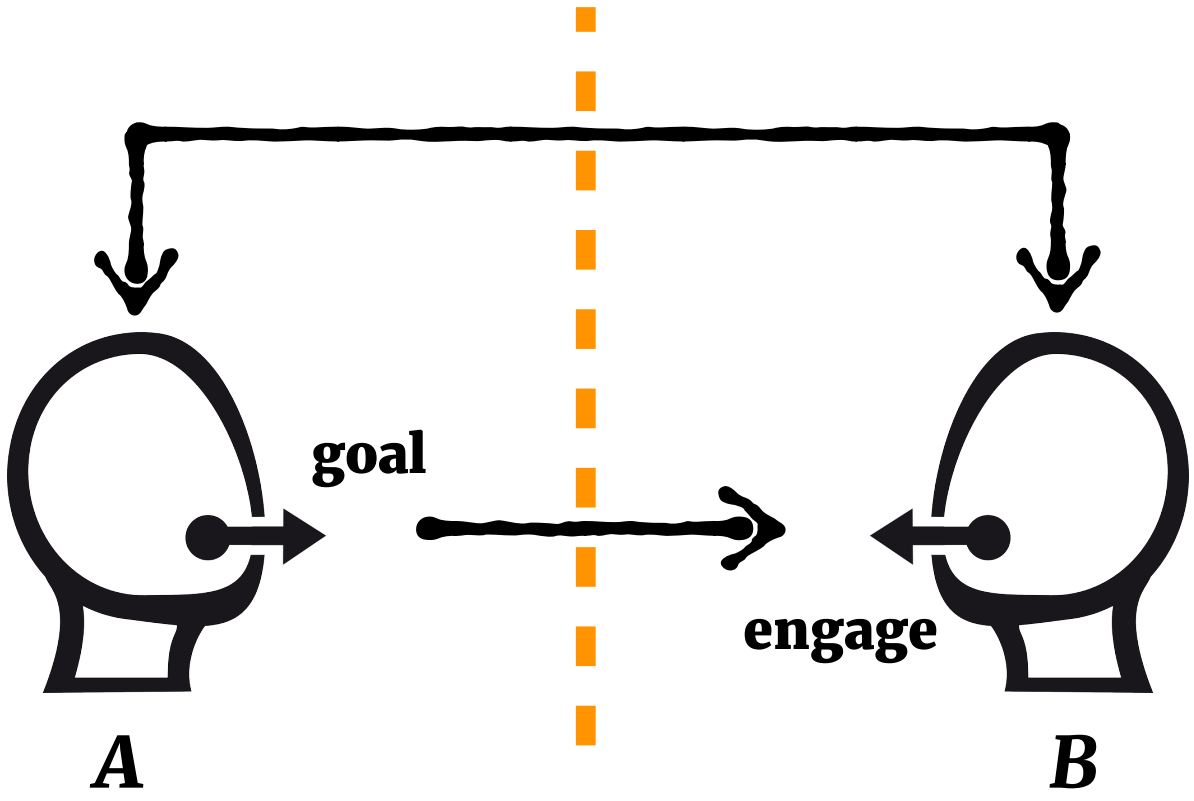
Why do we care about Computational Reproducibility?

“Science is a conversation”

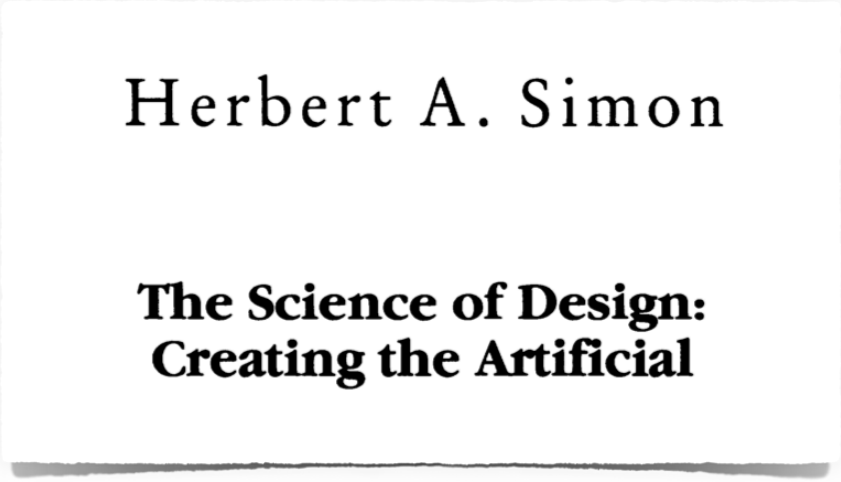
—Stephen Downes (“connectivism”)

- a conversation between scientists and their body of knowledge
- a conversation among scientists
- a conversation between scientists and machines…

What is a conversation?



How do we design (conversations) for reproducibility?



“Designing the User Interface”

—Ben Shneiderman, 6th ed.

Tools that succeed are:

- comprehensible,
- predictable, and
- controllable

“Designing the User Interface”

—Ben Shneiderman, 6th ed.

Those who have authority and responsibility must have adequate levels of control.

Responsibility should guide design.

Human control ↓↑ Automation

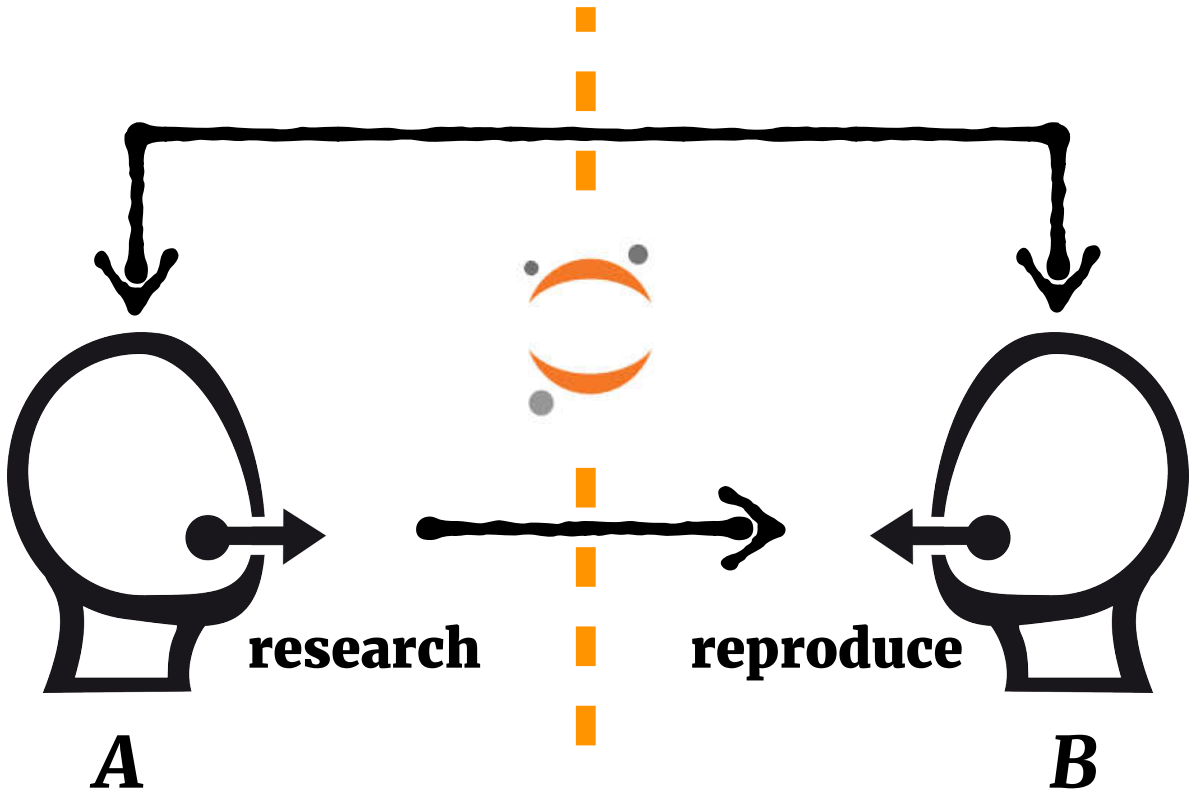
“Ensuring human control while increasing automation.”

On 21st-century design:

"...design has expanded from giving form to creating systems that support human interactions."

— Hugh Dubberly & Paul Pangaro,
Cybernetics and Design: Conversations for action (2015)

Conversation builds *trust*



“*I have a button here. I push the button.*
That’s not a conversation.”

— Paul Pangaro,
Rethinking Design Thinking, PICNIC Festival Amsterdam (2010)

Reproducibility:
not a one-click solution

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