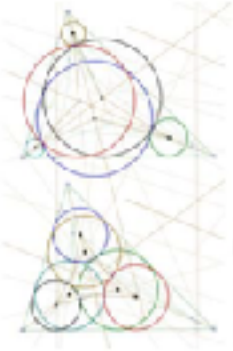
# Open Science @ EPFL

Prof. Pierre Vandergheynst

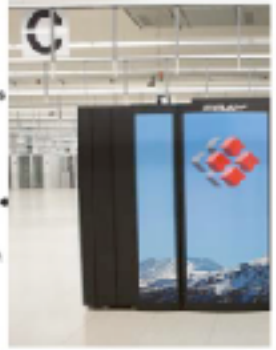
## Data Management and Open Data Workshop
## Lausanne, May 22th, 2017

Deductive



Empirical

Computational



Data driven (aka "Big Data")


Raise standards for preclinical cancer research

C. Glenn Begley and Lee M. Ellis propose how methods, publications and incentives must change if patients are to benefit.

**47 (out of 52) foundational cancer studies are not reproducible**

# A Pragmatic Action Plan

Data sets

Electronic Labbooks

Code

Preprints

Education

# Data Sets

Platform to archive / version data sets

Support Data Management Plans

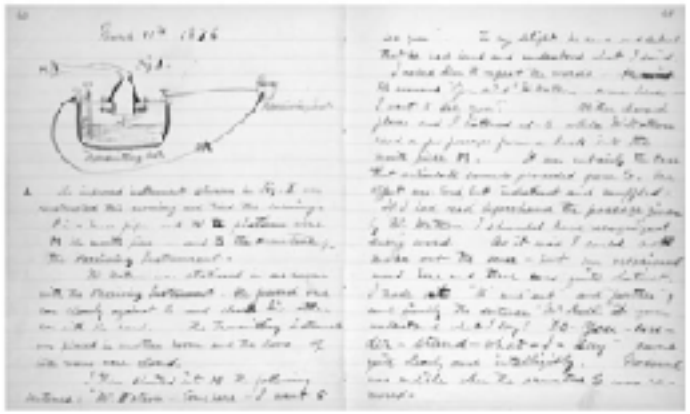
Swiss Data Science Center: a pilot project

# Electronic Labbooks

1665

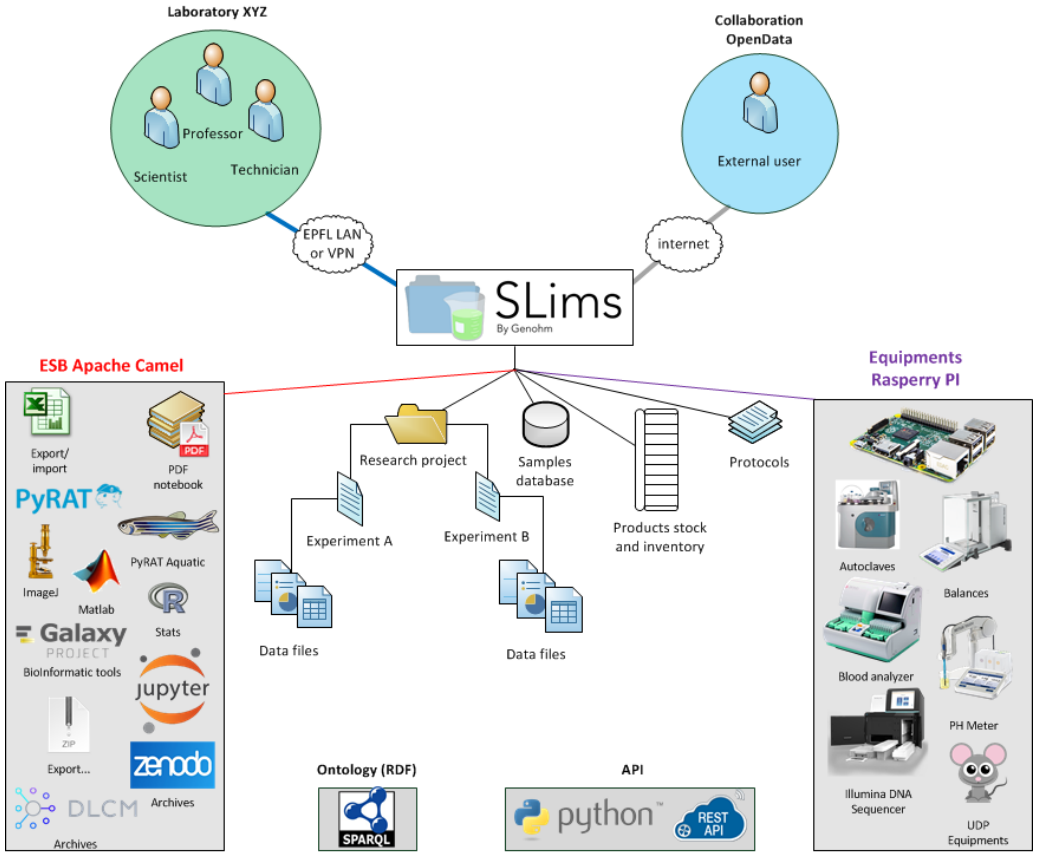
2017

1876



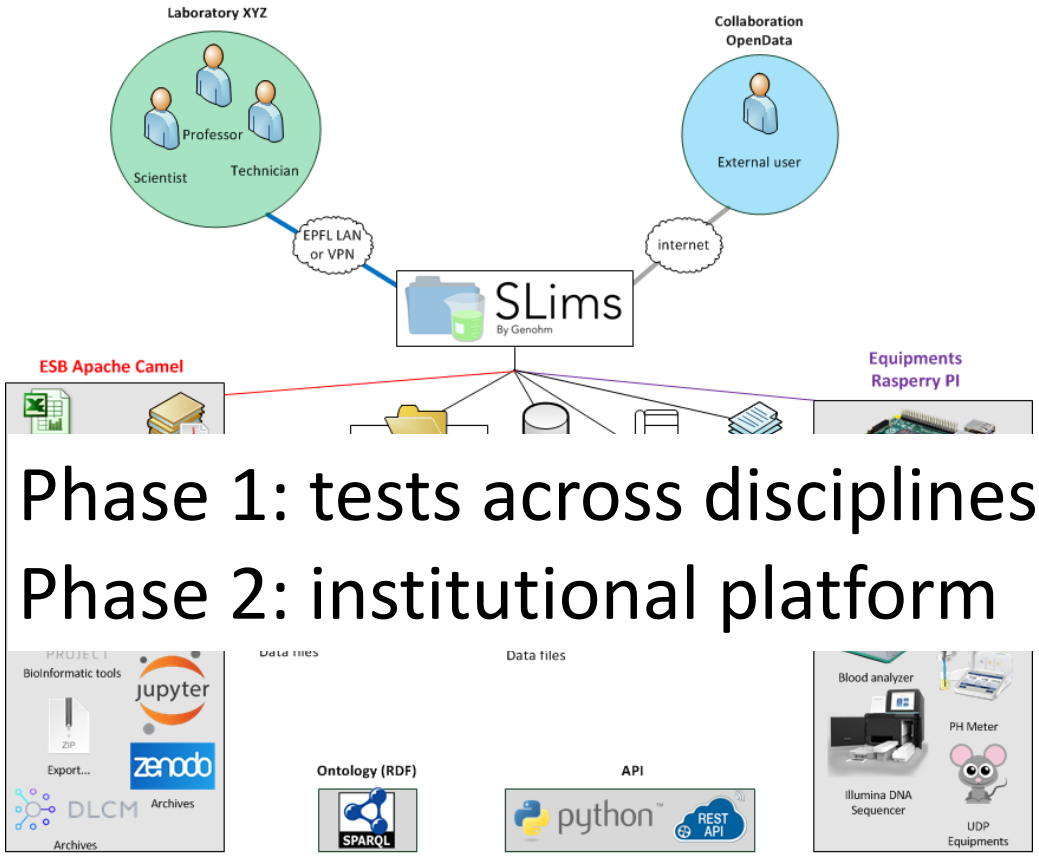
2017

# Pilot projects using SLIMS




in-house solutions also tested

# Pilot projects using SLIMS




in-house solutions also tested

# Code

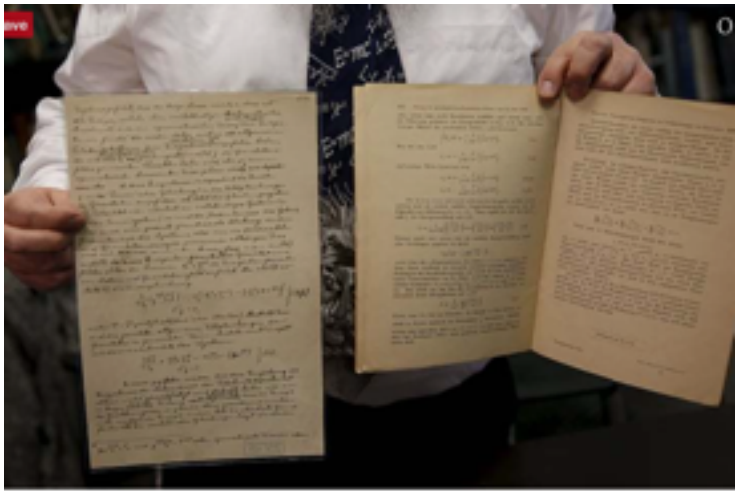
Code curation is well-known and tools exist (GIT, ...)

But code alone has limited value: code+data, parameters, dependencies, ...

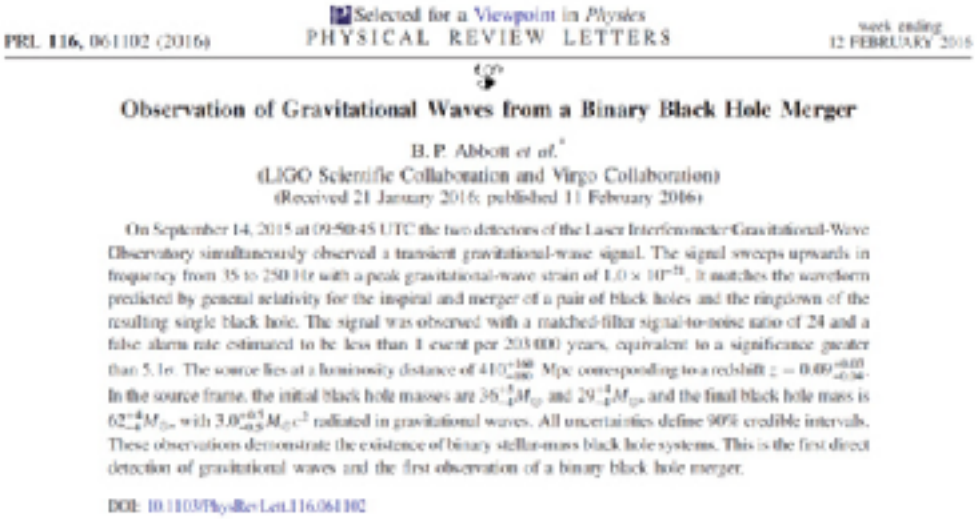
Follow “rich code” initiatives: C4Science, Beat-eu

# Preprints

The format of “The Paper” has not changed much in 100 years



Gravitational waves, take 1



Selected for a Viewpoint in *Physics*

PRL 116, 061102 (2016) PHYSICAL REVIEW LETTERS week ending 12 FEBRUARY 2016

**Observation of Gravitational Waves from a Binary Black Hole Merger**

B. P. Abbott *et al.*

(LIGO Scientific Collaboration and Virgo Collaboration)

(Received 21 January 2016; published 11 February 2016)

On September 14, 2015 at 09:50:45 UTC the two detectors of the Laser Interferometer Gravitational-Wave Observatory simultaneously observed a transient gravitational-wave signal. The signal sweeps upwards in frequency from 35 to 250 Hz with a peak gravitational-wave strain of $1.0 \times 10^{-21}$. It matches the waveform predicted by general relativity for the inspiral and merger of a pair of black holes and the ringdown of the resulting single black hole. The signal was observed with a matched-filter signal-to-noise ratio of 24 and a false alarm rate estimated to be less than 1 event per 203 000 years, equivalent to a significance greater than $5.1\sigma$. The source lies at a luminosity distance of $410^{+160}_{-180}$ Mpc corresponding to a redshift $z = 0.09^{+0.03}_{-0.04}$. In the source frame, the initial black hole masses are $36^{+5}_{-4} M_\odot$ and $29^{+4}_{-4} M_\odot$, and the final black hole mass is $62^{+4}_{-4} M_\odot$, with $3.0^{+0.5}_{-0.5} M_\odot c^2$ radiated in gravitational waves. All uncertainties define 90% credible intervals. These observations demonstrate the existence of binary stellar-mass black hole systems. This is the first direct detection of gravitational waves and the first observation of a binary black hole merger.

DOI: 10.1103/PhysRevLett.116.061102

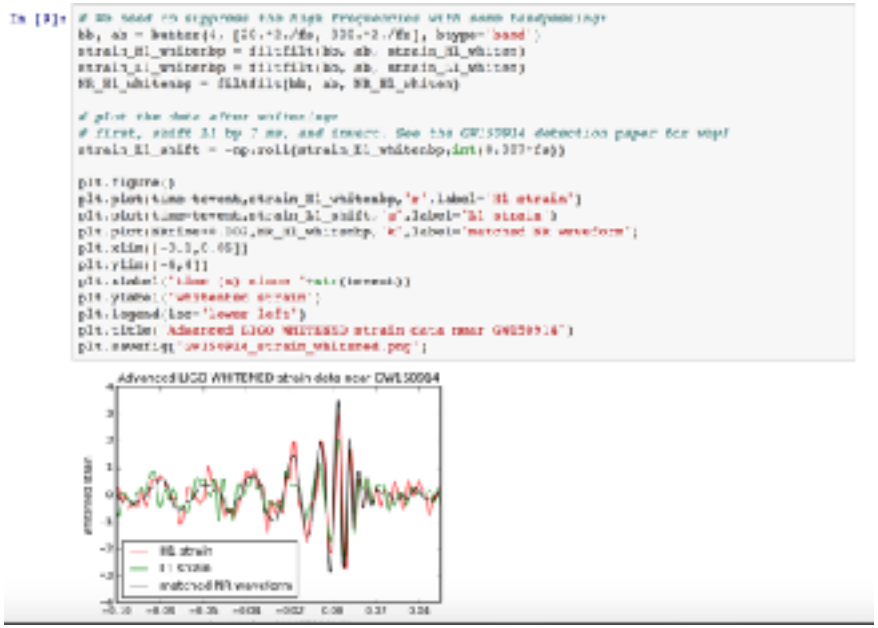
Gravitational waves, take 2

Only the medium has changed

Academic publishing scores VERY LOW on innovation

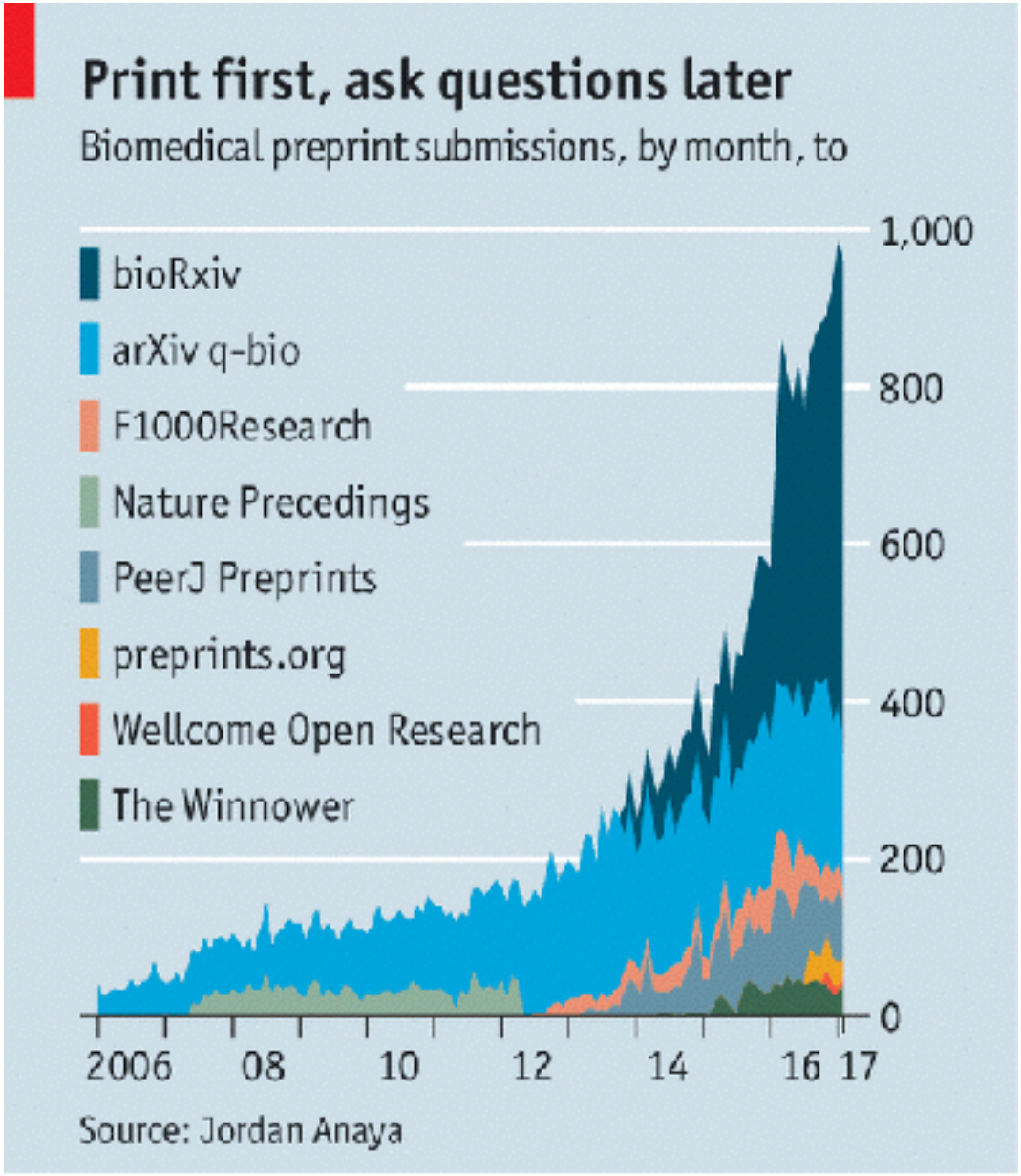
# The Paper 2.0

Where is the code ? Where is the data ?



Gravitational waves, take 3

Fundamental issues in reviewing & reproducibility




Economist.com

Data Preprint Code

# Invenio Digital Library Framework

Build your own fully customised digital library, institutional repository, multimedia archive, or research data repository on the web.

# Education

Awareness

Develop good practices

Integrate into your research workflow

An introduction to Open Science for all PhD students at EPFL